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The Water Cycle

Level 2- Python

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Introduction

All the water that is on our planet has been here since the beginning of life on earth… This means that every droplet of water must be constantly reused and passed around the planet to accommodate water's many roles worldwide.

So where does our water travel on its long journey to our taps? How is water constantly being reused and transported around the globe?

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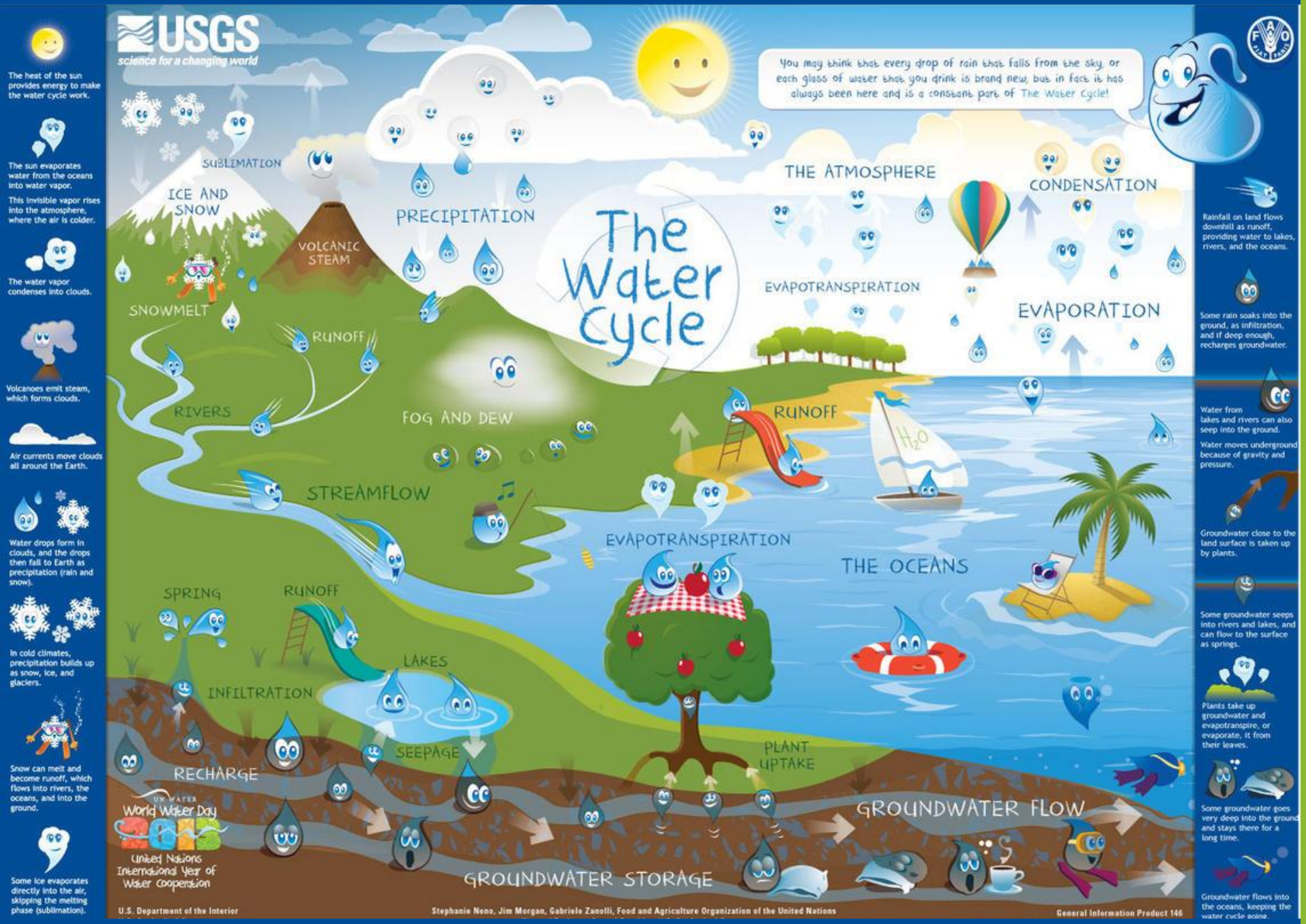

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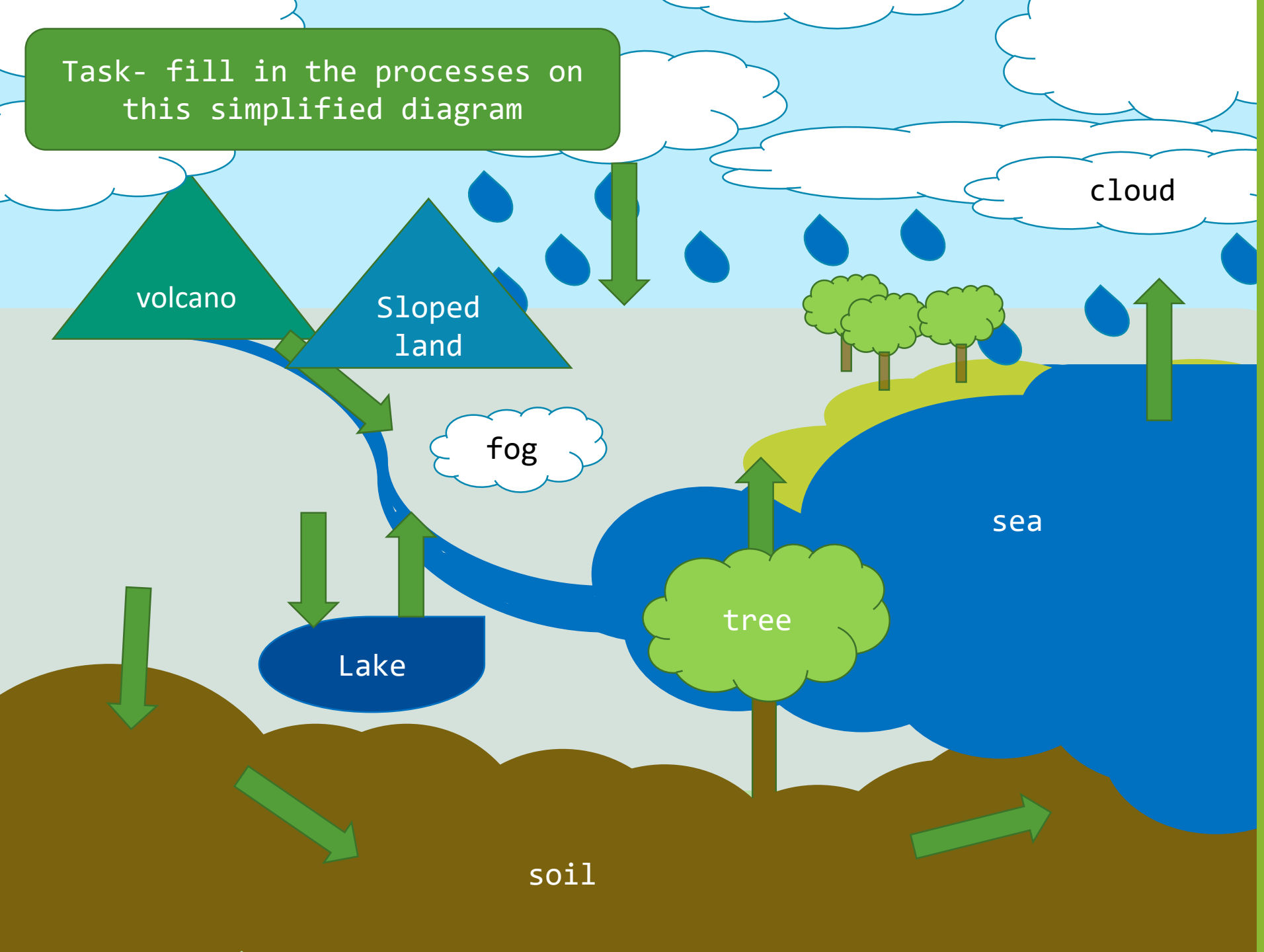
Task- fill in the processes on this simplified diagram



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Task

- Create a text adventure game for the journey of a water droplet as it moves through the various stages of the water cycle using embedded if statements

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Process

This program should:

- ✓Ask the user a series of questions to create an individual story for the journey of a water droplet, depending on the options entered by the user
- ✓Give the user the option to repeat the questioning after ‘the water has returned to the cloud’

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Subroutines

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Subroutines are sequences of instructions that perform a specific task.

- It may be easier to think of them as mini-programs within a large program.
- Subroutines consist of modules of code that perform different tasks.
- If these tasks are repeated throughout the program, they can be written as subroutines.
- Each subroutine is given a unique name so that it can be called and executed quickly throughout the program, without having to write the code again.
- This reduces the size of the code, making the program more logical and easier to read and maintain.

```
#Defining a subroutine:
def nameOfSubroutine():
        code goes here
#Calling a subroutine:
nameOfSubroutine()
```

```
1 def nameOfSubroutine(): #declaring
2     print("hello")
3 nameOfSubroutine()      #calling
```

Step 1

Defining the subroutine

To define a subroutine we will use the def() function. This subroutine will contain all of the story prompts and if statements later and will be called in the main program

```
1 def textAdventure():
2     print("\nIt sure is getting cold in this cloud!")
```

Remember: \n means that a new line will be entered before this line of text which you will see come into play later to create a more pleasing graphical user interface

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Step 2

Calling the subroutine

As you can see by the line number, there will be a lot more code in the subroutine, however for now, we will work on practicing calling the subroutine and giving the user the option to keep running the story to chose different options in the story

```
53 #main program
54 print("Welcome to life in the water cycle!")
55 print("You are a water droplet")
56 print("Throughout the game, you will be asked to chose your path in the story and explore the wonderful water cycle")
57 print("Time for your first choice...")
58
59 textAdventure()
```

Make sure to introduce your game with a bit of back story like what has been done here

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Loops

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A loop is a sequence of instructions that is continually repeated until a certain condition is reached.

In Python there are two main loops: 'WHILE Loops' (we only need while loops for this program) and 'FOR Loops'

While Loops are condition controlled and will repeat until their condition is false.

```
1
2  condition = True
3  while condition:
4      print("Repeating...")
5
6      print("Finish loop?")
7      finished = input()
8
9
10     if finished == "Y":
11         condition = False
12
```

```
Repeating...
Finish loop?
N
Repeating...
Finish loop?
N
Repeating...
Finish loop?
N
Repeating...
Finish loop?
Y
```

For loops are count controlled and will repeat a set number of times.

```
for i in range(5):
    print(i)
```

```
0
1
2
3
4
```

Step 3

Calling the subroutine

While the condition is true to run the loop, the code will ask the user if they would like to repeat the code (line 63), and if they do, then the subroutine “textAdventure()” will be called and will run until completion, until this while loop repeats

```
61 continueGame=True
62 while continueGame==True:
63     repeat=input("\nWould you like to play the game again to explore different choices? (yes or no)")
64     if repeat=="yes":
65         textAdventure()
66     else:
67         continueGame=False
68         print("\nThank you for playing!")
69
```

The condition will only change for this while loop, if the user enters no, when asked if they would like to continue the game. This is done on line 67 when the condition “continueGame” is set to false

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If statements

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```
if character in alphabet:
    print ("the character is in the alphabet")
else:
    print ("the character is NOT in the alphabet")
```

The IF statement is a decision-making statement that guides a program to make decisions based on specified criteria.

The IF statement executes one set of code if a specified condition is met (TRUE) or another set of code evaluates to FALSE.

Embedded if statements

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```
if letter=="abc":

    if letter2=="def":

        if letter3=="ghi":

            if letter4=="jkl":

            else:

        else:

    else:

        if letter5=="ghi":

            if letter6=="jkl":

            else:

        else:

            if letter7=="jkl":

            else:

else:
    if letter8=="def":

        if letter9=="ghi":

            if letter10=="jkl":

            else:

        else:

    else:

        if letter11=="ghi":

            if letter12=="jkl":

            else:

        else:

            if letter13=="jkl":

            else:
```

Embedded if statements will be used in this text to allow the user to make multiple choices which will lead them along different branches of the story. The more if statements you use in a row, the longer each branch will be and there will be more possibilities for where the story will go.

Can be identified by arrowlike shape of the code

Remember: it can be easy to get confused, each if statement should have an else statement connected to it at the same level of indent. See diagram.

If each of these branches were developed, they'd be the perfect template for our story. However be careful not to make it too complicated

Step 4

The story game itself

You can change the text to be whatever you want the story to say. As long as you follow the structure in the previous slide (making sure to watch your indentation and remembering to include an else statement with every if)

Click on this to zoom in

```
def textAdventure():
    print("\nIt sure is getting cold in this cloud!")
    userChoice1=input("Which form of precipitation would you like to take? (rain OR snow)")
    if userChoice1=="rain":
        userChoice2=input("Where would you like to fall down? (lake OR tree)")

        if userChoice2=="lake":
            userChoice3=input("Look at all the fish in this lake! What now? (chill OR travel down)")

            if userChoice3=="chill":
                userChoice4=input("You have decided to wait around. The temperature has started to rise and you feel full of energy. What now? (fly OR fog)")

                if userChoice4=="fly":
                    print("You have chosen to evaporate. You soar through the sky and condnese and cool to once again form a part of the cloud")

                else:
                    print("You are now fog on the surface of the ground")
                    print("You see that the sun is rising again and so are you until you condnese and cool to once again form a part of the cloud")

            else:
                userChoice4=input("as you move closer top the bottom of the lake, you see soil and decide to infiltrate. What now? (find roots OR find sea)")

                if userChoice4=="find roots":
                    print("You have found the roots of a tree. You are taken up by the root hair cells and travel to the leaves until you leave the surface")
                    print("You are now water vapor and are free to move around and do so ntil you condnese and cool to once again form a part of the cloud")

                else:
                    print("After finding the sea, you become a part of a large body of water and see beautiful marine life on your travels")
                    print("You spend hundreds of years here until you evaporate, condnese and cool to once again form a part of the cloud")

        else:
            userChoice3=input("Look at all the leaves on this tree (chill OR travel down)")
            if userChoice3=="chill":
                userChoice4=input("You have decided to wait around. The temperature has started to rise and you feel full of energy. What now? (fly OR fog)")

                if userChoice4=="fly":
                    print("You have chosen to evaporate. You soar through the sky and condnese and cool to once again form a part of the cloud")

                else:
                    print("You are now fog on the surface of the ground")
                    print("You see that the sun is rising again and so are you until you condnese and cool to once again form a part of the cloud")

            else:
                print("as you move closer to the roots of the tree, you see soil and decide to infiltrate and eventually stumble across the sea during groundwater flow")
                print("After finding the sea, you become a part of a large body of water and see beautiful marine life on your travels")
                print("You spend hundreds of years here until you evaporate, condnese and cool to once again form a part of the cloud")

    else:
        print("You explore the wonders of the coldest parts of the world and see many new animals and forms of wildlife")
        print("It may be a long time before you have the energy to melt and then vaporise")
        print("You hang around until you evaporate, condnese and cool to once again form a part of the cloud")

```

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```
def textAdventure():
    print("\nIt sure is getting cold in this cloud!")
    userChoice1=input("Which form of precipitation would you like to take? (rain OR snow)")
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        userChoice2=input("Where would you like to fall down? (lake OR tree)")

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                else:
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            else:
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                if userChoice4=="find roots":
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                else:
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                print("as you move closer to the roots of the tree, you see soil and decide to infiltrate and eventually stu
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                print("You spend hundreds of years here until you evaporate, condnese and cool to once again form a part of

    else:
        print("You explore the wonders of the coldest parts of the world and see many new animals and forms of wildlife")
        print("It may be a long time before you have the energy to melt and then vaporise")
        print("You hang around until you evaporate, condnese and cool to once again form a part of the cloud")
```

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You might notice that this story can feel quite repetitive and a lot of the branches are quite similar. In your version, get as creative as possible to engage your reader!

What the code should look like…

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```
def textAdventure():
    print("\nIt sure is getting cold in this cloud!")
    userChoice1=input("Which form of precipitation would you like to take? (rain OR snow)")
    if userChoice1=="rain":
        userChoice2=input("Where would you like to fall down? (lake OR tree)")

        if userChoice2=="lake":
            userChoice3=input("Look at all the fish in this lake! What now? (chill OR travel down)")

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        else:
            userChoice3=input("Look at all the leaves on this tree (chill OR travel down)")
            if userChoice3=="chill":
                userChoice4=input("You have decided to wait around. The temperature has started to rise and you feel full of energy. What now? (fly OR fog)")

                if userChoice4=="fly":
                    print("You have chosen to evaporate. You soar through the sky and condnese and cool to once again form a part of the cloud")

                else:
                    print("You are now fog on the surface of the ground")
                    print("You see that the sun is rising again and so are you until you condnese and cool to once again form a part of the cloud")

            else:
                print("as you move closer to the roots of the tree, you see soil and decide to infiltrate and eventually stumble across the sea during groundwater flow")
                print("After finding the sea, you become a part of a large body of water and see beautiful marine life on your travels")
                print("You spend hundreds of years here until you evaporate, condnese and cool to once again form a part of the cloud")

    else:
        print("You explore the wonders of the coldest parts of the world and see many new animals and forms of wildlife")
        print("It may be a long time before you have the energy to melt and then vaporise")
        print("You hang around until you evaporate, condnese and cool to once again form a part of the cloud")

#main program
print("Welcome to life in the water cycle!")
print("You are a water droplet")
print("Throughout the game, you will be asked to chose your path in the story and explore the wonderful water cycle")
print("Time for your first choice...")

textAdventure()

continueGame=True
while continueGame==True:
    repeat=input("\nWould you like to play the game again to explore different choices? (yes or no)")
    if repeat=="yes":
        textAdventure()
    else:
        continueGame=False
        print("\nThank you for playing!")


```

```
Welcome to life in the water cycle!
You are a water droplet
Throughout the game, you will be asked to chose your path in the story and explore the wonderful water cycle
Time for your first choice...

It sure is getting cold in this cloud!
Which form of precipitation would you like to take? (rain OR snow)rain
Where would you like to fall down? (lake OR tree)lake
Look at all the fish in this lake! What now? (chill OR travel down)chill
as you move closer top the bottom of the lake, you see soil and decide to infiltrate. What now? (find roots OR find sea)find roots
You have found the roots of a tree. You are taken up by the root hair cells and travel to the leaves until you leave the surface
You are now water vapor and are free to move around and do so ntil you condnese and cool to once again form a part of the cloud

Would you like to play the game again to explore different choices? (yes or no)yes

It sure is getting cold in this cloud!
Which form of precipitation would you like to take? (rain OR snow)snow
You explore the wonders of the coldest parts of the world and see many new animals and forms of wildlife
It may be a long time before you have the energy to melt and then vaporise
You hang around until you evaporate, condnese and cool to once again form a part of the cloud

Would you like to play the game again to explore different choices? (yes or no)yes

It sure is getting cold in this cloud!
Which form of precipitation would you like to take? (rain OR snow)rain
Where would you like to fall down? (lake OR tree)tree
Look at all the leaves on this tree (chill OR travel down)travel down
as you move closer to the roots of the tree, you see soil and decide to infiltrate and eventually stumble across the sea during groundwater flow
After finding the sea, you become a part of a large body of water and see beautiful marine life on your travels
You spend hundreds of years here until you evaporate, condnese and cool to once again form a part of the cloud

Would you like to play the game again to explore different choices? (yes or no)no

Thank you for playing!
>>>
```

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That's a lot of code- be sure to debug as you go along and use comments where appropriate

Conclusion

Learning outcomes. After this lesson you should be able to:

- ✓use embedded if statements with confidence
- ✓Create and call a (procedure) subroutine
- ✓Use a while loop
- ✓Use the print and input function with confidence
- ✓Name variables with appropriate names that make sense in the code

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Links to everyday life…

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Play- Environment

play -code can be adapted to write fun and interactive stories with friends

environment- increases the awareness about an important recycling mechanism in nature

Water cycle info:

- https://www.usgs.gov/media/images/water-cycle-schools

Online, more complicated version of a text adventure game

- https://eblong.com/zarf/zweb/dreamhold/

Congratulations!

You have created a text adventure game!

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