Q1. Explain with an example each when to use a for loop and a while loop.

Use a **for** loop when you know the number of iterations or are working with sequences. For example, iterating over a range or a list.

Example of a for loop

```
for i in range(1, 6):
    print(i)
```

Use a *while* loop when you need to repeat a block of code as long as a certain condition is true, and the number of iterations is not known in advance. For example, countdown or user input validation.

Example of a while loop

```
countdown = 5
while countdown > 0:
    print(countdown)
    countdown -= 1
```

Q2. Write a python program to print the sum and product of the first 10 natural numbers using for and while loop.

```
# Using a for loop
sum_for = 0
product_for = 1

for num in range(1, 11):
    sum_for += num
    product_for *= num

print("Using for loop:")
print("Sum:", sum_for)
print("Product:", product_for)
print()

# Using a while loop
sum_while = 0
product_while = 1
count = 1

while count <= 10:
    sum_while += count
    product_while *= count
    count += 1

print("Using while loop:")
print("Sum:", sum_while)
print("Product:", product_while)
```

Q4. Create a list of numbers from 1 to 100. Use for loop and while loop to calculate the cube of each number and if the cube of that number is divisible by 4 or 5 then append that number in a list and print hat list.The per-unit charges in rupees are as follows: For the first 100 units, the user will be charged Rs. 4.5 per unit, for the next 100 units, the user will be charged Rs. 6 per unit, and for the next 100 units, the user will be charged Rs. 10 per unit, After 300 units and above the user will be charged Rs. 20 per unit.

Ans. Certainly! Here's a Python program that creates a list of numbers from 1 to 100, calculates the cube of each number using both a `for` loop and a `while` loop, appends the numbers whose cubes are divisible by 4 or 5 into a separate list, and calculates the total charge based on the given charging rules:

```
# Taking units of electricity consumed as input from the user
units_consumed = int(input("Enter the units of electricity consumed in a month: "))

# Initialize a list to store numbers whose cubes are divisible by 4 or 5
selected_numbers = []

# Calculate the cube of each number and check divisibility
for num in range(1, 101):
    cube = num ** 3
    if cube % 4 == 0 or cube % 5 == 0:
        selected_numbers.append(num)

# Print the list of selected numbers using a for loop
print("Using for loop:")
print("Numbers whose cube is divisible by 4 or 5:", selected_numbers)
print()

# Reset selected_numbers for the while loop
selected_numbers = []

# Using a while loop
count = 1
while count <= 100:
    cube = count ** 3
    if cube % 4 == 0 or cube % 5 == 0:
        selected_numbers.append(count)
    count += 1

# Print the list of selected numbers using a while loop
print("Using while loop:")
```

```
print("Numbers whose cube is divisible by 4 or 5:", selected_numbers)
print()

# Calculate the total charge based on the charging rules
total_units = units_consumed
total_charge = 0

if total_units <= 100:
    total_charge = total_units * 4.5
elif total_units <= 200:
    total_charge = 100 * 4.5 + (total_units - 100) * 6
elif total_units <= 300:
    total_charge = 100 * 4.5 + 100 * 6 + (total_units - 200) * 10
else:
    total_charge = 100 * 4.5 + 100 * 6 + 100 * 10 + (total_units - 300) * 20

# Print the total electricity bill
print(f"Total units consumed: {total_units}")
print(f"Total charge: Rs. {total_charge}")
```

This program calculates the cube of each number using both a `for` loop and a `while` loop, appends numbers whose cubes are divisible by 4 or 5 to a list, and then calculates the total charge based on the provided charging rules.

Q4. Create a list of numbers from 1 to 100. Use for loop and while loop to calculate the cube of each number and if the cube of that number is divisible by 4 or 5 then append that number in a list and print that list.

Ans. Certainly! Here's a Python program that creates a list of numbers from 1 to 100, calculates the cube of each number using both a `for` loop and a `while` loop, and appends numbers whose cubes are divisible by 4 or 5 into a list:

```
# Initialize a list to store numbers whose cubes are divisible by 4 or 5
selected_numbers_for = []

# Calculate the cube of each number and check divisibility using a for
loop
for num in range(1, 101):
    cube = num ** 3
    if cube % 4 == 0 or cube % 5 == 0:
        selected_numbers_for.append(num)

# Print the list of selected numbers using a for loop
print("Using for loop:")
print("Numbers whose cube is divisible by 4 or 5:", selected_numbers_for)
print()

# Reset selected_numbers_for for the while loop
selected_numbers_while = []

# Using a while loop
count = 1
while count <= 100:
    cube = count ** 3
    if cube % 4 == 0 or cube % 5 == 0:
        selected_numbers_while.append(count)
    count += 1

# Print the list of selected numbers using a while loop
print("Using while loop:")
print("Numbers whose cube is divisible by 4 or 5:",
selected_numbers_while)
```

This program iterates through each character in the given string and checks if the character is a vowel (both lowercase and uppercase). The count of vowels is then printed.

Q5. Write a program to filter count vowels in the below-given string.
string = "I want to become a data scientist"

Ans: Certainly! Here's a Python program to count the vowels in the given string:

```
# Given string
string = "I want to become a data scientist"

# Convert the string to lowercase to handle both uppercase and
lowercase vowels
lowercase_string = string.lower()

# Initialize a variable to count vowels
vowel_count = 0

# Define a set of vowels for checking
vowels = set("aeiou")

# Iterate through each character in the string
for char in lowercase_string:
    # Check if the character is a vowel
    if char in vowels:
        vowel_count += 1

# Print the count of vowels
print("Count of vowels in the string:", vowel_count)
```