Topic 5: Use of Sequence Control Structure

Learning Outcomes:

(a) Identify the appropriate control structures (sequence, selection, repetition)

INTRODUCTION TO CONTROL STRUCTURES

1. Determine the flow of control in a program.
2. These control structures allow you to do two things:
   - skip some statements while executing others
   - repeat one or more statements while some condition is true.
3. Types of control structure:
   - sequence
   - selection
   - repetition

1. Sequence Control Structures

Programs are **executed one after the other sequentially** from the beginning to end.

```
1  # Prompting the user for height and width
2  height = float(input("Enter the height of the rectangle: "))
3  width = float(input("Enter the width of the rectangle: "))
4
5  # Calculating the area of the rectangle
6  area = height * width
7
8  # Displaying the area of the rectangle
9  print("The area of the rectangle is:", area)
```

**** All statements will be executed (line 1 to 9); none will be skipped.***

Example of Sequence Control Structures problems

1. Write a python code segment to calculate area of circle.
2. Write a program segment that prompt user for their weight and height, calculates their Body Mass Index (BMI), and displays the result.
3. Final mark for a student is calculated from the total of 60% of continuous evaluation mark and 40% of final examination mark. Calculate and print the final mark for a student. Write a program segment.
4. Write a program segment to calculate the pay price of a meal after being charged with 10% sales tax and 6% service tax.

Example of Sequence Control Structures problems

5. A hotel offers two types of room with different rates in Table 1. The hotel offers a 10% discount on the total room charge. You are going to make a reservation of one Superior room and one Deluxe room for a few nights. Write a program segment to Calculate and display the total room charge that you have to pay.

Room Type	Rate per night (RM)
Superior	160
Deluxe	180

Example 1

Write a python code segment to calculate area of circle.

IPO Model	
Input	radius
Process	calculate area based on radius
Output	area

Example 1

Input	radius
Process	calculate area based on radius
Output	area

Pseudocode
start
read radius
area = 3.142 x radius x radius
display area
stop

Example 1

Pseudocode
start
read radius
area = 3.142 x radius x radius
display area
stop

Program segment
`radius = float(input("Enter the radius of the circle: "))`
`area = 3.142 * radius ** 2`
`print("The area of the circle is:", area)`

Example 2

Write a program segment that prompt user for their weight and height, calculates their Body Mass Index (BMI), and displays the result.

IPO Model

Input : weight, height

Process : Calculate BMI **based on weight and height**

Output : BMI

Example 2

IPO Model

Input : weight, height

Process : Calculate BMI **based on weight and height**

Output : BMI

Pseudocode
start
read weight, height
BMI = weight / (height * height)
display BMI
stop

Example 2

Program Segment

```
# Prompting the user for weight and height
weight = float(input("Enter your weight in kilograms: "))
height = float(input("Enter your height in meters: "))

# Calculating BMI
bmi = weight / (height ** 2)

# Displaying the result
print("Your Body Mass Index (BMI) is:", bmi)
```

Output

```
Enter your weight in kilograms: 70
Enter your height in meters: 1.69
Your Body Mass Index (BMI) is: 24.508945765204302
```

Example 3

Final mark for a student is calculated from the total of 60% of continuous evaluation mark and 40% of final examination mark. Calculate and print the final mark for a student. Write a program segment.

IPO Model	
Input	continuous_evaluation_mark, final_exam_mark
Process	To calculate final mark based on continuous evaluation mark and final exam mark
Output	final_mark

Example 3

IPO Model	
Input	continuous_evaluation_mark, final_exam_mark
Process	To calculate final mark based on continuous evaluation mark and final exam mark
Output	final_mark

Pseudocode
start
read continuous_evaluation_mark, final_exam_mark
final_mark = (continuous_evaluation_mark * 0.6) + (final_exam_mark * 0.4)
display final_mark
stop

Example 3

Program Segment

```
# Prompting the user for continuous evaluation mark and final examination mark
continuous_evaluation_mark = float(input("Enter the continuous evaluation mark: "))
final_exam_mark = float(input("Enter the final examination mark: "))

# Calculating final mark
final_mark = (continuous_evaluation_mark * 0.6) + (final_exam_mark * 0.4)

# Displaying the final mark
print("The final mark for the student is:", final_mark)
```

Output

```
Enter the continuous evaluation mark: 87
Enter the final examination mark: 89
The final mark for the student is: 87.8
```

Example 4

Write a program segment to calculate the pay price of a meal after being charged with 10% sales tax and 6% service tax.

IPO Model	
Input	original_price
Process	calculate total_price based on original_price, sales tax and service tax
Output	total_price

Example 4

IPO Model	
Input	original_price
Process	calculate total_price based on original_price, sales tax and service tax
Output	total_price

Pseudocode
start
read original_price
total_price = original_price + (original_price*0.10) + (original_price*0.06)
display total_price
stop

Example 4

Program segment

```
# Prompting the user for the original price of the meal
original_price = float(input("Enter the original price of the meal: "))


# Calculating the total price including taxes
total_price = original_price + (original_price*0.10) + (original_price*0.06)


# Displaying the total price
print("The total price of the meal after taxes is:", total_price)
```

Example 5

A hotel offers two types of room with different rates in Table 1. The hotel offers a 10% discount on the total room charge. You are going to make a reservation of one Superior room and one Deluxe room for a few nights. Write a program segment to Calculate and display the total room charge that you have to pay.

Table1

Room Type	Rate per night (RM)
Superior	160
Deluxe	180

Example 5

IPO Model	
Input	nights
Process	calculate total_after_discount based on nights and discounted price
Output	total_after_discount

Pseudocode
start
read nights
total_after_discount = nights * (160 + 180) * 0.90
display total_after_discount
stop

Example 5

Program segment

```
# Read number of nights
nights = int(input("Enter the number of nights for the reservation: "))


# Calculating total room charge after discount
total_after_discount = nights  * (160 + 180) * 0.90

# Displaying the total room charge after discount
print("The total room charge after applying a 10% discount is:", total_after_discount)
```

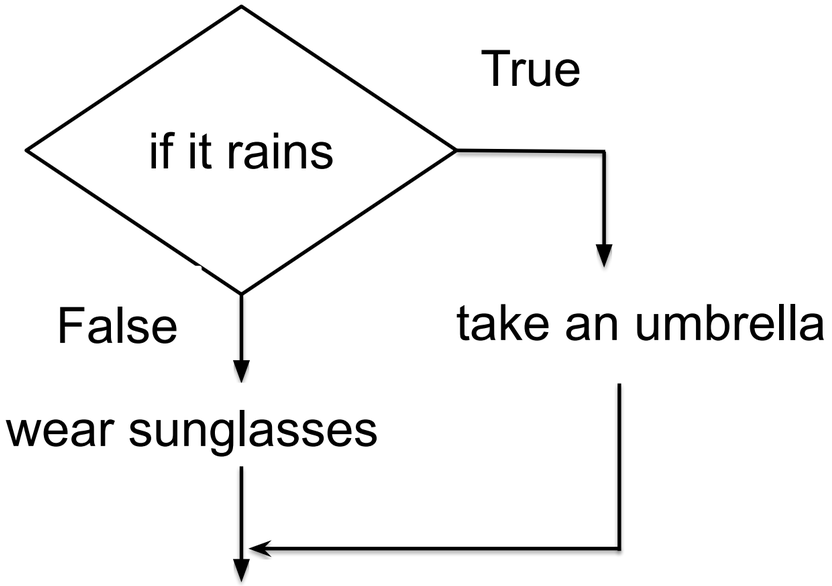
Topic 5: Use of Sequence Control Structure

Learning Outcomes:

(a) Identify the appropriate control structures (sequence, selection, repetition)

Selection Control Structure (Decision Making)

- Allows the program to **choose** between different options based on conditions.
- Uses **if, if-else, and if-elif-else** statements.
- Example: **"If it rains, take an umbrella; otherwise, wear sunglasses."**



Selection Control Structure (Decision Making)

📌 If you score 100 marks, you get a reward.

📌If you spend more than RM100, you get a 10% discount. Otherwise, no discount is given.

📌If you return a book late, pay a fine. Otherwise, no fine is needed.

📌Checking student grades based on marks:

A (80 - 100)

B (70 - 79)

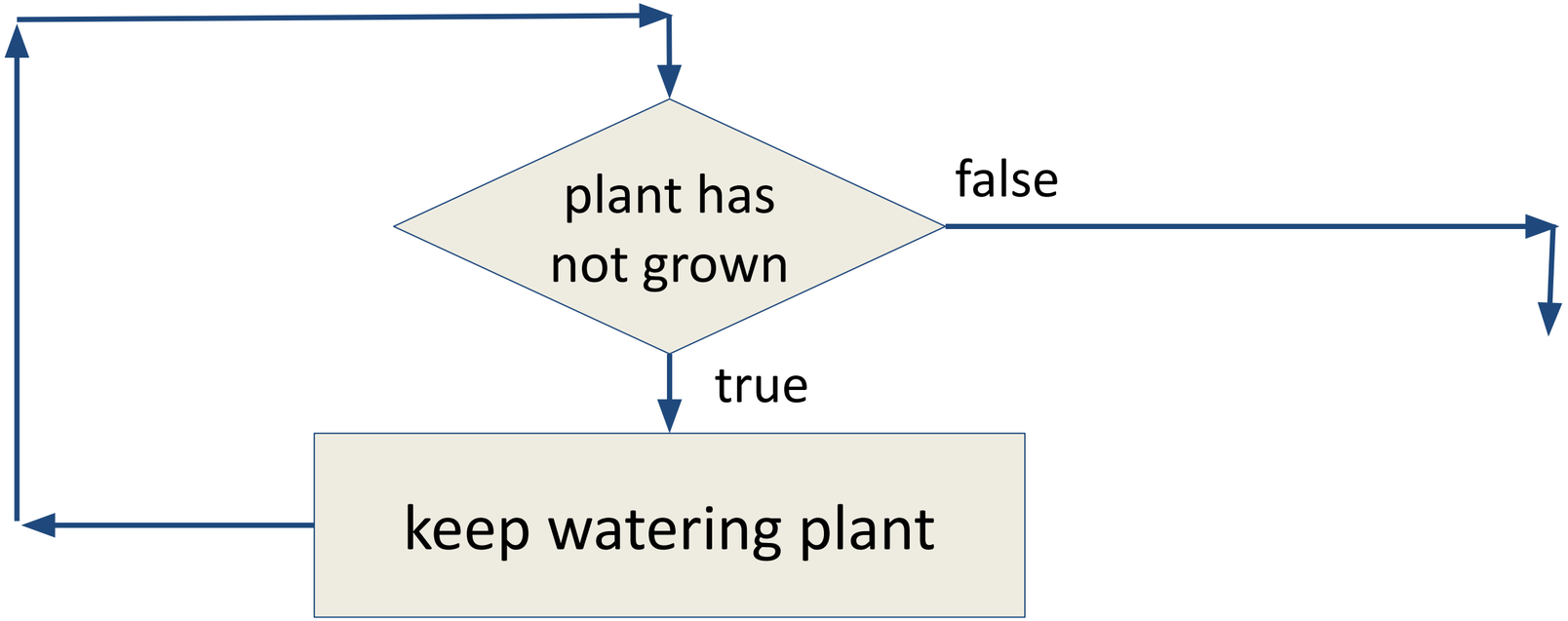
C (60 - 69)

F (0 - 59)

3. Repetition Control Structures

Repetition Control Structure (Loops)

- Allows the program to **repeat** a block of code multiple times.
- Uses **for loop** (fixed repetitions) and **while loop** (repeats until a condition is false).
- Example: **"Keep watering the plants every day until they grow."**



1️⃣ Using a `for` Loop (Fixed Repetitions)

✅ Example: Counting Steps During Exercise

- A person does 10 jumping jacks every morning.
- **Repeats exactly 10 times.**

✅ Example: Distributing Exam Papers

- A teacher distributes one paper to each of 30 students.
- **Repeats exactly 30 times.**

✅ Example: Setting an Alarm

- The school bell rings every hour from 8 AM to 3 PM.
- **Repeats exactly 8 times**

2️⃣ Using a `while` Loop (Repeats Until a Condition is False)

✅ Example: Filling a Water Bottle

- Keep filling the bottle until it is full.
- **Repeats an unknown number of times until the bottle is full.**

✅ Example: Waiting for a Bus

- A person waits at the bus stop until the bus arrives.
- **Repeats until the bus comes.**

✅ Example: Saving Money for a Goal

- A person saves RM10 every week until they have RM100.
- **Repeats until total savings reach RM100.**

Identify the appropriate control structure (sequence, selection, repetition) for each of the following scenario.

A program checks if a person’s temperature is above 37.5°C. If true, it displays "You have a fever"; otherwise, it says "Normal temperature".	
A self-checkout machine keeps scanning items until the user presses the "Pay" button.	
A program calculates and displays the total price of three purchased items.	

Identify the appropriate control structure (sequence, selection, repetition) for each of the following scenario.

A program prints even numbers from 1 to 100.	
A program asks the user to enter two numbers, then calculates and displays the sum.	
A program checks if a number entered by the user is positive, negative, or zero and prints the result.	