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**Topic 10 - Comparison Operators**  
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**Introduction**

In Python, comparison operators allow us to compare values and create conditions. They are essential for decision-making, especially within if statements. This lesson introduces the different types of comparison operators, including ==, !=, >, <, >=, and <=, and explains how to use them effectively in code.

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**What are Comparison Operators?**

Comparison operators are symbols used to compare two values or expressions. When used within if statements, they evaluate conditions as either True or False, allowing us to control program flow.

**Types of Comparison Operators:**

1. **Equality (==)**: Checks if two values are equal.
2. **Not Equal (!=)**: Checks if two values are not equal.
3. **Greater Than (>)**: Checks if the left value is greater than the right value.
4. **Less Than (<)**: Checks if the left value is less than the right value.
5. **Greater Than or Equal To (>=)**: Checks if the left value is greater than or equal to the right.
6. **Less Than or Equal To (<=)**: Checks if the left value is less than or equal to the right.

**Examples of Comparison Operators:**

*if full\_name == "Mark Myers":*

*print("Full name matches.")*

*if total\_cost != 200:*

*print("Cost does not match.")*

*if age >= 18:*

*print("You are eligible.")*

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**Why Use Comparison Operators?**

Comparison operators are essential for:

* **Controlling Program Flow**: They allow programs to make decisions based on conditions.
* **Validating Data**: They help ensure values meet specific criteria (e.g., age restrictions).
* **Creating Dynamic Logic**: Enable conditional responses in programs for a more interactive user experience.

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**How to Use Comparison Operators in Python**

1. **Equality and Not Equal Operators (== and !=)**  
   These are used to compare strings, numbers, variables, and expressions:

*if your\_ticket\_number != 487208:*

*print("Better luck next time.")*

* + **Case Sensitivity**: When comparing strings, Python is case-sensitive ("Rose" != "rose" is True).

1. **Greater Than and Less Than Operators (> and <)**  
   Use these to compare numerical values:

*if temperature > 100:*

*print("It's very hot!")*

*if age < 18:*

*print("You are a minor.")*

1. **Greater Than or Equal To and Less Than or Equal To (>= and <=)**  
   These check if one value is greater than or equal to or less than or equal to another:

*if balance >= 0:*

*print("Balance is positive.")*

*if quantity <= stock:*

*print("Order can be fulfilled.")*

1. **Using Comparison Operators in Complex Expressions**  
   You can use multiple variables or expressions in comparisons:

*if x + y == a - b:*

*print("The values match.")*

*if total\_cost == materials\_cost + labor\_cost:*

*print("Total cost is correct.")*

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Comparison operators are a foundational part of programming, providing the flexibility to make decisions and validate data based on conditions. By understanding and using ==, !=, >, <, >=, and <=, developers can build interactive, dynamic, and logically structured Python programs.