**Comparison Operators with Equations**

The following examples demonstrate how to use comparison operators with the data types **int** (integers, whole numbers) and **float** (number with a decimal point or fractional value). Comparison operators return Boolean results. As you learned previously, Boolean is a data type that can hold only one of two values: **True** or **False**.

The comparison operators include:

* **==** (equality)
* **!=** (not equal to)
* **>** (greater than)
* **<** (less than)
* **>=** (greater than or equal to)
* **<=** (less than or equal to)

**PART 1: Equality == and Not Equal To != Operators**

In Python, you can use comparison operators to compare values. When a comparison is made, Python returns a Boolean result: **True** or **False**. Note that Boolean data types are not string data types (Boolean **True** is not equal to the string "True").

* To check if two values are the same, use the **equality operator**: **==**
* To check if two values are not the same, use the **not equal to operator**: **!=**

The print() function can be used to display the results of the comparisons.

**Examples:**

print(32 == 30+2)   # The == operator checks if the 2 values are

True                # equal to each other. If they are equal,

                    # Python returns a True result.

print(5+10 == 6+7)  # If the two values are not equal, as in the

False               # expression 5+10 == 6+7 (or 15 == 13), Python

                    # returns a False result.

print(10-4 != 10+4) # The != operator checks if the 2 values are

True                # NOT equal to each other. If true, Python

                    # returns a True result.

print(9/3 != 3\*1)   # In this last example, 9/3 != 3\*1 (or 3 != 3)

False               # is false. So, Python returns a False value.

**The equality == operator versus the equals = operator**

It is important to note that the equality **==** comparison operator performs a different task than the equals **=** assignment operator. The equals **=** operator assigns the value on the right side of the equals **=** to the object (e.g., a variable) on the left side of the equals **=** operator.

**Examples:**

# The = equals assignment operator is used to assign a value to a

# variable.

my\_variable = 3\*5           # Assigns a value to my\_variable

print(my\_variable)          # Printing the variable returns the

15                          # value assigned to the variable.

# The == equality comparison operator checks if the values of the two

# expressions on either side of the == operator are equivalent to one

# another.

print(my\_variable == 3\*5)   # Printing the variable returns a Boolean

True                        # True or False result.

**PART 2: Greater Than > and Less Than < Operators**

The comparison operators greater than **>** and less than **<** also return a **True** or **False** Boolean result after comparing two values.

* To check if one value is larger than another value, use the greater than operator: **>**
* To check if one value is smaller than another value, use the less than operator: **<**

**Examples:**

print(11 > 3\*3)         # The > operator checks if the left value is

True                    # greater than the right value. If true, it

                        # returns a True result.

print(4/2 > 8-4)        # If the > operator finds that the left value

False                   # is NOT greater than the right value, the

                        # comparison will return a False result.

print(4/2 < 8-4)        # The < operator checks  if the left value is

True                    # less than the right side. If true, the

                        # comparison returns a True result.

print(11 < 3\*3)         # If the < operator finds that the left side is False

                        # NOT less than the right value, Python returns

False                   # a False result.

**PART 3: Greater Than or Equal to >= and Less Than or Equal to <= Operators**

Like the other comparison operators, the greater than or equal to **>=** and less than or equal to **<=** operators return a **True** or **False** Boolean result when a comparison is made.

* To check if one value is larger than or equal to another value, use the greater than or equal to operator: **>=**
* To check if one value is smaller than or equal to another value, use the less than or equal to operator: **<=**

**Examples:**

                    # value, the comparison returns a False result.

print(15 <= 18/2)   # If the <= comparison determines that the left

False               # value is NOT less than or equal to the right

                    # right value. Again, if one of the two

                    # conditions is true, Python returns a True

                    # result.

print(12\*2 <= 30)   # The <= operator checks if the left value is

True                # less than or equal to the right value. In

                    # this case, the left value is less than the

print(18/2 >= 15)   # If the >= comparison determines that the left False

False               # value is NOT greater than or equal to the

                    # right, it returns a False result.

                    # returns a True result.

                    # If one of these conditions is true,

                    # Python returns a True result. In this case

                    # the two values are equal. So, the comparison

print(12\*2 >= 24)   # The >= operator checks if the left value is

True                # greater than or equal to the right value.

For additional Python practice, the following links will take you to several popular online interpreters and codepads:

* [Welcome to Python](https://www.python.org/shell/)
* [Online Python Interpreter](https://www.onlinegdb.com/online_python_interpreter)
* [Create a new Repl](https://repl.it/languages/python3)
* [Online Python-3 Compiler (Interpreter)](https://www.tutorialspoint.com/execute_python3_online.php)
* [Compile Python 3 Online](https://rextester.com/l/python3_online_compiler)
* [Your Python Trinket](https://trinket.io/python3)

**Key takeaways**

Python comparison operators return Boolean results: **True** or **False**.

| **Symbol** | **Name** | **Expression** | **Description** |
| --- | --- | --- | --- |
| **==** | Equality operator | a == b | a is equal to b |
| **!=** | Not equal to operator | a != b | a is **not** equal to b |
| **>** | Greater than operator | a > b | a is larger than b |
| **>=** | Greater than or equal to operator | a >= b | a is larger than or equal to b |
| **<** | Less than operator | a < b | a is smaller than b |
| **<=** | Less than or equal to operator | a <= b | a is smaller than or equal to b |

**Resources for more information**

For more information about the concepts covered in these practice exercises, please visit:

* [Order of Operations](https://www.mathsisfun.com/operation-order-pemdas.html) - A refresher on the mathematical Order of Operations.
* [Python Comparison Operators with Syntax and Example](https://data-flair.training/blogs/python-comparison-operators/) - Provides examples of more complex comparisons.
* [Raise numbers to a power: here’s how to exponentiate in Python](https://kodify.net/python/math/exponents/) - Explains multiple methods for calculating exponents in Python.