**Python Data Types**

Data types determine the type of value a variable can hold and the operations that can be performed on it. They define the format, structure, size, range, and behavior of data, controlling how it's stored and used in a program. This helps ensure data is used correctly and efficiently.

## Python Numeric Types - MCQs

---

**1. Which of the following is NOT a numeric type in Python?**

A. int
B. float
C. complex
D. str

**Answer:** D. str

✅ *Explanation:* str is a string type, not a numeric type. Python's built-in numeric types are int, float, and complex.

---

**2. What will be the type of the result of 3 + 4.0 in Python?**

A. int
B. float
C. complex
D. str

**Answer:** B. float

✅ *Explanation:* When an int and a float are added, the result is automatically a float.

---

**3. Which of the following values is of type complex?**

A. 5
B. 5.0
C. 5 + 3j
D. 5j + 0

**Answer:** C. 5 + 3j

✅ *Explanation:* A number with a real and imaginary part is a complex number in Python.

---

**4. What will type(1j) return?**

A. <class 'float'>
B. <class 'int'>
C. <class 'complex'>
D. <class 'str'>

**Answer:** C. <class 'complex'>

✅ *Explanation:* 1j represents a complex number with no real part and an imaginary part of 1.

---

**5. What is the output of type(10.0)?**

A. <class 'int'>
B. <class 'float'>
C. <class 'complex'>
D. <class 'double'>

**Answer:** B. <class 'float'>

✅ *Explanation:* Even though 10.0 is numerically an integer, the .0 makes it a float in Python.

---

**6. What will be the result of the expression int(3.9)?**

A. 3

B. 4

C. 3.9

D. Error

**Answer:** A. 3

✅ *Explanation:* int() truncates the decimal part, it does not round.

---

**7. Which of the following can be used to represent very large or very small floating-point numbers in Python?**

A. Hexadecimal

B. Binary

C. Exponential notation

D. Octal

**Answer:** C. Exponential notation

✅ *Explanation:* You can use e or E to represent floats in scientific notation, e.g., 1.5e2.

---

**8. What is the output of type(3 + 4j).__name__?**

A. 'int'

B. 'float'

C. 'complex'

D. 'number'

**Answer:** C. 'complex'

✅ *Explanation:* The expression type(3 + 4j).__name__ gives the name of the type as a string: 'complex'.

## Python Boolean Types – MCQs

**1. What are the two Boolean values in Python?**

A. Yes and No

B. 1 and 0

C. True and False

D. 'True' and 'False'

**Answer:** C. True and False

✅ *Explanation:* Python uses True and False as its Boolean values (note the capitalization).

---

**2. What is the output of bool(0) in Python?**

A. True

B. False

C. 0

D. Error

**Answer:** B. False

✅ *Explanation:* 0 is considered False in a Boolean context.

---

**3. What is the result of bool("Hello")?**
A. True
B. False
C. "Hello"
D. None
**Answer:** A. True
✅ *Explanation:* Non-empty strings are considered True.

---

**4. Which of the following is NOT considered False in Python?**
A. []
B. 0.0
C. {}
D. " " (a string with a space)
**Answer:** D. " "
✅ *Explanation:* Although it looks "empty", " " is a non-empty string and is thus True.

---

**5. What is the type of the result of the expression 5 > 3?**
A. int
B. float
C. bool
D. str
**Answer:** C. bool
✅ *Explanation:* Comparison operations return Boolean values (True or False).

---

**6. What is the result of True + True in Python?**
A. True
B. 2
C. 1
D. Error
**Answer:** B. 2
✅ *Explanation:* In Python, True is internally treated as 1, so True + True equals 2.

---

**7. What does bool(None) return?**
A. None
B. True
C. False
D. 0
**Answer:** C. False
✅ *Explanation:* None is considered False in a Boolean context.

---

**8. What will be the result of this expression: bool([])?**
A. True
B. False
C. None
D. []
**Answer:** B. False
✅ *Explanation:* An empty list is considered False.

**9. Which of the following values evaluates to True in a Boolean context?**
A. 0
B. ""
C. None
D. [1, 2, 3]
**Answer:** D. [1, 2, 3]
✅ *Explanation:* Non-empty containers (like lists, dicts, strings) evaluate to True.

---

**10. What will type(True) return?**
A. <class 'int'>
B. <class 'bool'>
C. <class 'str'>
D. <class 'float'>
**Answer:** B. <class 'bool'>
✅ *Explanation:* True is a Boolean value and belongs to the bool class.
Python Sequence Types – MCQs
**1. Which of the following is NOT a sequence type in Python?**
A. list
B. tuple
C. dict
D. str
**Answer:** C. dict
✅ *Explanation:* dict is a mapping type, not a sequence type. list, tuple, and str are all sequences.

---

**2. Which of these sequence types is immutable?**
A. list
B. tuple
C. str
D. Both B and C
**Answer:** D. Both B and C
✅ *Explanation:* tuple and str are immutable, meaning their elements cannot be changed after creation.

---

**3. What is the output of len("Python")?**
A. 5
B. 6
C. 7
D. Error
**Answer:** B. 6
✅ *Explanation:* "Python" has 6 characters.

---

**4. Which method is used to add an element to the end of a list?**

A. add()

B. insert()

C. append()

D. push()

**Answer:** C. append()

✅ *Explanation:* append() adds an element to the end of the list.

---

**5. What will be the result of list("abc")?**

A. ['abc']

B. ['a', 'b', 'c']

C. 'abc'

D. Error

**Answer:** B. ['a', 'b', 'c']

✅ *Explanation:* Converting a string to a list splits it into individual characters.

---

**6. What does range(5) return?**

A. [0, 1, 2, 3, 4, 5]

B. (0, 1, 2, 3, 4)

C. range(0, 5)

D. Error

**Answer:** C. range(0, 5)

✅ *Explanation:* range(5) creates a range object from 0 to 4. It needs to be converted with list() to see the actual values.

---

**7. How do you access the second element of a tuple t = (10, 20, 30)?**

A. t[1]

B. t(1)

C. t[2]

D. t{1}

**Answer:** A. t[1]

✅ *Explanation:* Indexing starts at 0. So t[1] gives the second element.

---

**8. What happens when you try to modify a string in Python like s = "hello"; s[0] = 'H'?**

A. "Hello"

B. 'h'

C. Error

D. "hello"

**Answer:** C. Error

✅ *Explanation:* Strings are immutable, so you cannot change individual characters.

---

**9. What will be the output of list(range(1, 5))?**

A. [1, 2, 3, 4, 5]

B. [1, 2, 3, 4]

C. [0, 1, 2, 3, 4]

D. [0, 1, 2, 3, 4, 5]

**Answer:** B. [1, 2, 3, 4]

✅ *Explanation:* range(start, stop) includes the start but excludes the stop value.

---

**10. Which of the following supports item assignment (i.e., you can change an element)?**
A. tuple
B. list
C. str
D. range
**Answer:** B. list
✅ *Explanation:* Only lists are mutable and support item assignment.

## Python Set Types – MCQs

**1. Which of the following is a valid way to create a set in Python?**
A. s = {1, 2, 3}
B. s = set([1, 2, 3])
C. s = set()
D. All of the above
**Answer:** D. All of the above
✅ *Explanation:* Sets can be created using curly braces or the set() constructor.

---

**2. What is the main characteristic of a Python set?**
A. Ordered and allows duplicates
B. Ordered and immutable
C. Unordered and allows duplicates
D. Unordered and does not allow duplicates
**Answer:** D. Unordered and does not allow duplicates
✅ *Explanation:* Sets are unordered collections of unique elements.

---

**3. What will be the output of set([1, 2, 2, 3])?**
A. {1, 2, 2, 3}
B. {1, 2, 3}
C. [1, 2, 3]
D. (1, 2, 3)
**Answer:** B. {1, 2, 3}
✅ *Explanation:* Duplicates are removed automatically in a set.

---

**4. Which operation is used to add a single element to a set?**
A. append()
B. add()
C. insert()
D. extend()
**Answer:** B. add()
✅ *Explanation:* Use .add() to add a single item to a set.

---

**5. What will happen if you try to add a list to a set?**

A. It will be added

B. It will be converted to a tuple

C. Nothing happens

D. Error will occur

**Answer:** D. Error will occur

✅ *Explanation:* Lists are unhashable (mutable), so they can't be added to sets.

---

**6. What does the set() constructor return if passed a string like set("abc")?**

A. {'abc'}

B. ['a', 'b', 'c']

C. {'a', 'b', 'c'}

D. ('a', 'b', 'c')

**Answer:** C. {'a', 'b', 'c'}

✅ *Explanation:* It splits the string into characters and stores them as unique elements.

---

**7. Which set method removes all elements?**

A. clear()

B. delete()

C. remove()

D. discard()

**Answer:** A. clear()

✅ *Explanation:* clear() empties the entire set.

---

**8. What’s the difference between remove() and discard() in sets?**

A. No difference

B. remove() throws an error if the element doesn't exist; discard() does not

C. discard() throws an error if the element doesn't exist; remove() does not

D. Both throw errors

**Answer:** B. remove() throws an error if the element doesn't exist; discard() does not

✅ *Explanation:* discard() is safer when you're unsure if the item exists.

---

**9. What is the result of {1, 2, 3} | {3, 4, 5}?**

A. {3}

B. {1, 2, 3, 4, 5}

C. {1, 2}

D. {4, 5}

**Answer:** B. {1, 2, 3, 4, 5}

✅ *Explanation:* | is the union operator, combining all unique elements.

---

**10. What is the output of {1, 2, 3} & {2, 3, 4}?**

A. {1, 2, 3, 4}

B. {1, 4}

C. {2, 3}

D. {}

**Answer:** C. {2, 3}

✅ *Explanation:* & is the intersection operator, returning only common elements.

# Python Mapping Types (Dictionary) – MCQs

**1. Which of the following is the standard mapping type in Python?**

A. list

B. dict

C. tuple

D. set

**Answer:** B. dict

✅ *Explanation:* The built-in mapping type in Python is dict, which maps keys to values.

---

**2. What is the correct syntax to access the value associated with key 'name' in a dictionary person?**

A. person.name

B. person('name')

C. person['name']

D. person->name

**Answer:** C. person['name']

✅ *Explanation:* Use square brackets to access values via their keys in a dictionary.

---

**3. What will be the output of dict([('a', 1), ('b', 2)])?**

A. {'a': 1, 'b': 2}

B. [('a', 1), ('b', 2)]

C. {1: 'a', 2: 'b'}

D. Error

**Answer:** A. {'a': 1, 'b': 2}

✅ *Explanation:* The dict() constructor can take a list of key-value pairs (tuples).

---

**4. Which method removes all items from a dictionary?**

A. delete()

B. clear()

C. remove()

D. pop()

**Answer:** B. clear()

✅ *Explanation:* clear() removes all items from a dictionary.

---

**5. What happens when you use a mutable type (like a list) as a dictionary key?**

A. It works fine

B. The list gets converted to a string

C. Raises a TypeError

D. It silently fails

**Answer:** C. Raises a TypeError

✅ *Explanation:* Dictionary keys must be hashable (immutable); lists are not.

---

**6. What will dict.get('key') return if 'key' does not exist?**
A. 0
B. False
C. None
D. Error
**Answer:** C. None
✅ *Explanation:* .get() returns None by default if the key is not found (unless a default is specified).

**7. What is the output of len({'a': 1, 'b': 2, 'c': 3})?**
A. 2
B. 3
C. 1
D. 0
**Answer:** B. 3
✅ *Explanation:* There are 3 key-value pairs, so the length is 3.

---

**8. Which method can be used to get all keys in a dictionary?**
A. all_keys()
B. keys()
C. get_keys()
D. values()
**Answer:** B. keys()
✅ *Explanation:* dict.keys() returns a view of all the keys.

---

**9. What is the output of {'a': 1, 'b': 2} == {'b': 2, 'a': 1}?**
A. False
B. True
C. Depends on Python version
D. Error
**Answer:** B. True
✅ *Explanation:* Dictionaries are unordered but equal if they have the same key-value pairs.

---

**10. How can you remove a key from a dictionary and get its value?**
A. remove()
B. discard()
C. pop()
D. delete()
**Answer:** C. pop()
✅ *Explanation:* pop(key) removes the key and returns its value.

# Python Binary Types – MCQs

**1. Which of the following is not a binary type in Python?**

A. bytes  
B. bytearray  
C. memoryview  
D. binview

**Answer:** D. binview

✅ *Explanation:* binview is not a valid type. bytes, bytearray, and memoryview are the actual binary types in Python.

---

**2. What is the main difference between bytes and bytearray?**

A. bytes is mutable; bytearray is immutable  
B. bytearray is mutable; bytes is immutable  
C. Both are mutable  
D. Both are immutable

**Answer:** B. bytearray is mutable; bytes is immutable

✅ *Explanation:* bytearray objects can be modified in-place, while bytes objects cannot.

---

**3. What will bytes([65, 66, 67]) return?**

A. 'ABC'  
B. b'ABC'  
C. [65, 66, 67]  
D. {65, 66, 67}

**Answer:** B. b'ABC'

✅ *Explanation:* The numbers represent ASCII values for A, B, C.

---

**4. How do you create an empty bytearray?**

A. bytearray()  
B. bytearray(0)  
C. bytearray([])  
D. All of the above

**Answer:** D. All of the above

✅ *Explanation:* All three are valid ways to create an empty or zero-length bytearray.

---

**5. Which of the following is true about memoryview?**

A. It makes a copy of the bytes object  
B. It can only be created from a list  
C. It allows access to the internal data without copying  
D. It is slower than using a bytearray

**Answer:** C. It allows access to the internal data without copying

✅ *Explanation:* memoryview lets you work with slices of binary data efficiently, without copying.

---

**6. What is the output of b'abc'[0]?**

A. 'a'

B. 97

C. b'a'

D. Error

**Answer:** B. 97

✅ *Explanation:* In a bytes object, indexing returns the ASCII integer value.

---

**7. What will bytearray(b'hello')[1] = 97 do?**

A. Replace the second byte with 'a'

B. Replace the second byte with 97

C. Throw an error

D. None of the above

**Answer:** A. Replace the second byte with 'a'

✅ *Explanation:* ASCII 97 is 'a', so the result would be bytearray(b'hallo').

**8. Which function is used to convert a string to a bytes object?**

A. str()

B. bytes()

C. encode()

D. decode()

**Answer:** C. encode()

✅ *Explanation:* encode() converts a string to bytes, e.g., "hello".encode().

---

**9. What will len(bytes(4)) return?**

A. 0

B. 1

C. 4

D. Error

**Answer:** C. 4

✅ *Explanation:* bytes(4) returns 4 zero-bytes: b'\x00\x00\x00\x00'.

---

**10. Which of the following can you slice like a list?**

A. bytes

B. bytearray

C. memoryview

D. All of the above

**Answer:** D. All of the above

✅ *Explanation:* All binary types support slicing operations.

# Python Number Systems – MCQs

**1. What is the prefix for a binary number in Python?**
A. 0b
B. 0x
C. 0o
D. bin
**Answer:** A. 0b
✅ *Explanation:* In Python, binary numbers are prefixed with 0b or 0B, e.g., 0b1010.

---

**2. Which of the following is a valid hexadecimal number in Python?**
A. 0o19
B. 0x1G
C. 0x1F
D. 0b102
**Answer:** C. 0x1F
✅ *Explanation:* 0x denotes a hexadecimal number. 1F is valid (decimal 31).

---

**3. What will int('1010', 2) return?**
A. 10
B. 5
C. 2
D. 1010
**Answer:** A. 10
✅ *Explanation:* Converts the binary string '1010' to decimal.

---

**4. How is an octal number represented in Python?**
A. With 0x prefix
B. With 0b prefix
C. With 0o prefix
D. With 8x prefix
**Answer:** C. With 0o prefix
✅ *Explanation:* Octal numbers use 0o or 0O prefix (e.g., 0o10 for 8 in decimal).

---

**5. What is the output of hex(255)?**
A. '255'
B. '0xFF'
C. '0xff'
D. 255
**Answer:** C. '0xff'
✅ *Explanation:* hex() returns a string representation with a lowercase '0x' prefix.

---

**6. What does bin(10) return in Python?**
A. '10'
B. '0b1010'
C. '0xA'
D. 10
**Answer:** B. '0b1010'
✅ *Explanation:* Converts decimal 10 to binary string with prefix.

---

**7. What base does the built-in int() function assume if no base is specified?**
A. 2
B. 8
C. 10
D. 16
**Answer:** C. 10
✅ *Explanation:* int() assumes base 10 by default unless otherwise specified.

---

**8. Which of the following will convert a decimal number to octal?**
A. hex()
B. oct()
C. bin()
D. int()
**Answer:** B. oct()
✅ *Explanation:* oct() returns a string with 0o prefix.

---

**9. What will int('1f', 16) return?**
A. 31
B. 16
C. 15
D. Error
**Answer:** A. 31
✅ *Explanation:* '1f' in hexadecimal is 31 in decimal.

---

**10. What is the output of int('77', 8)?**
A. 77
B. 63
C. 55
D. 99
**Answer:** B. 63
✅ *Explanation:* 77 in octal equals 63 in decimal.

## Python UTF-8 – MCQs

**1. What does UTF-8 stand for?**
A. Unicode Transmission Format - 8 bytes
B. Universal Text Format - 8 bit
C. Unicode Transformation Format - 8 bit
D. Unicode Text File - 8 version
**Answer:** C. Unicode Transformation Format - 8 bit
✅ *Explanation:* UTF-8 is a variable-length character encoding for Unicode.

---

**2. Which Python method is used to convert a string to UTF-8 bytes?**

A. bytes()<br>
B. encode()<br>
C. decode()<br>
D. utf8()

**Answer:** B. encode()

✅ *Explanation:* .encode('utf-8') converts a string to bytes in UTF-8 format.

---

**3. What is the output of "hello".encode("utf-8")?**

A. hello<br>
B. ['h', 'e', 'l', 'l', 'o']<br>
C. b'hello'<br>
D. b'68656c6c6f'

**Answer:** C. b'hello'

✅ *Explanation:* Encoding a simple ASCII string in UTF-8 gives the same characters as bytes.

---

**4. Which method decodes UTF-8 bytes back into a string?**

A. decode('utf-8')<br>
B. encode('utf-8')<br>
C. str()<br>
D. bytes()

**Answer:** A. decode('utf-8')

✅ *Explanation:* Use .decode('utf-8') on a bytes object to get the original string.

**5. What is the output of len("€") in Python?**

A. 1<br>
B. 2<br>
C. 3<br>
D. 4

**Answer:** A. 1

✅ *Explanation:* It's 1 Unicode character, even if it's 3 bytes in UTF-8.

---

**6. What is the output of len("€".encode("utf-8"))?**

A. 1<br>
B. 2<br>
C. 3<br>
D. 4

**Answer:** C. 3

✅ *Explanation:* UTF-8 uses 3 bytes to encode the Euro symbol (€).

---

**7. Which Python type stores UTF-8 encoded text as bytes?**

A. str<br>
B. list<br>
C. bytes<br>
D. dict

**Answer:** C. bytes

✅ *Explanation:* Encoded text is stored as bytes, which is a binary type in Python.

---

**8. What happens when you decode a non-UTF-8 byte sequence using UTF-8?**

A. It works fine

B. It returns empty string

C. It raises a UnicodeDecodeError

D. It returns None

**Answer:** C. It raises a UnicodeDecodeError

✅ *Explanation:* Invalid byte sequences raise an error during decoding.

---

**9. Which of the following can be used to handle decoding errors gracefully?**

A. decode(errors='ignore')

B. decode(errors='replace')

C. Both A and B

D. None of the above

**Answer:** C. Both A and B

✅ *Explanation:* 'ignore' skips invalid bytes, 'replace' substitutes with �.

---

**10. Which encoding is the default for .encode() and .decode() in Python 3 if none is specified?**

A. ASCII

B. ISO-8859-1

C. UTF-8

D. UTF-16

**Answer:** C. UTF-8

✅ *Explanation:* Python 3 uses UTF-8 as the default encoding for strings.

## Python None Data Type – MCQs

**1. What does None represent in Python?**

A. An empty string

B. Zero

C. Null or absence of a value

D. False

**Answer:** C. Null or absence of a value

✅ *Explanation:* None is a special constant in Python representing the absence of a value.

---

**2. What is the type of None in Python?**

A. str

B. int

C. bool

D. NoneType

**Answer:** D. NoneType

✅ *Explanation:* None is the sole instance of the NoneType type.

---

**3. Which of the following statements is used to check if a variable is None?**

A. if x == None:

B. if x = None:

C. if x is None:

D. if x == "None":

**Answer:** C. if x is None:

✅ *Explanation:* Use is to compare with None because it checks identity, not just value.

---

**4. What is the output of print(type(None))?**

A. <class 'null'>

B. <class 'None'>

C. <class 'NoneType'>

D. <class 'undefined'>

**Answer:** C. <class 'NoneType'>

✅ *Explanation:* None belongs to NoneType.

---

**5. What is the return value of a function that doesn't explicitly return anything?**

A. 0

B. False

C. ''

D. None

**Answer:** D. None

✅ *Explanation:* If a function has no return statement, it returns None by default.

---

**6. What will this print?**

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```
x = None
print(x == False)
```

A. True

B. False

C. None

D. Error

**Answer:** B. False

✅ *Explanation:* None is not equal to False, though both are falsy.

---

**7. Which of the following is True?**

A. bool(None)

B. None == 0

C. None == False

D. None != True

**Answer:** D. None != True

✅ *Explanation:* None is not equal to True, False, or 0, though its boolean value is False.

---

**8. What happens if you write x = None + 1?**
A. It returns 1
B. It returns None
C. It raises a TypeError
D. It returns 0
**Answer:** C. It raises a TypeError
✅ *Explanation:* You can't perform arithmetic with None.

---

**9. Which built-in constant represents "no value" in Python?**
A. nil
B. empty
C. None
D. undefined
**Answer:** C. None
✅ *Explanation:* Python uses None to signify "no value."

---

**10. What is the boolean value of None in an if condition?**
A. True
B. False
C. None
D. Raises Error
**Answer:** B. False
✅ *Explanation:* None evaluates as False in a boolean context.

## Python id() Function – MCQs

**1. What does the id() function return in Python?**
A. The type of the object
B. The name of the object
C. The identity (memory address) of the object
D. The hash value of the object
**Answer:** C. The identity (memory address) of the object
✅ *Explanation:* id() returns a unique integer identifier for the object during its lifetime.

---

**2. What will the following code print?**
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```
a = 10
b = 10
print(id(a) == id(b))
```

A. True
B. False
C. Error
D. Depends on system
**Answer:** A. True
✅ *Explanation:* Small integers (typically from -5 to 256) are **interned**, so they refer to the same object.

---

**3. Which of the following is true about id() values in Python?**

A. They always increase over time

B. They are unique for each object during its lifetime

C. They are reused across variables

D. They are random numbers

**Answer:** B. They are unique for each object during its lifetime

✅ *Explanation:* id() is unique only while the object exists in memory.

---

**4. What is the output?**

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```
x = [1, 2, 3]
y = x
print(id(x) == id(y))
```

A. True

B. False

C. None

D. Error

**Answer:** A. True

✅ *Explanation:* y is referencing the same list object as x, so they share the same id.

---

**5. What happens to the id() of an object after it is deleted with del?**

A. It stays the same

B. It is set to 0

C. It becomes None

D. It becomes invalid / reclaimed

**Answer:** D. It becomes invalid / reclaimed

✅ *Explanation:* Once an object is deleted, its memory can be reused, and its ID is no longer valid.

---

**6. Which of the following would most likely have different id() values?**

A. Two variables assigned 1000

B. Two identical lists created separately

C. Two variables pointing to the same dictionary

D. A variable reassigned to itself

**Answer:** B. Two identical lists created separately

✅ *Explanation:* Even if their content is the same, they are **separate objects** in memory.

---

**7. What will this print?**

python

CopyEdit

```
a = [1, 2]
b = a.copy()
print(id(a) == id(b))
```

A. True
B. False
C. None
D. Error

**Answer:** B. False

✅ *Explanation:* .copy() creates a new list with a different memory address.

---

**8. Can two different objects ever have the same id() in the same program execution?**

A. Yes, always
B. Yes, if one is deleted first
C. No, never
D. Only for strings

**Answer:** B. Yes, if one is deleted first

✅ *Explanation:* Once an object is destroyed, its memory may be reused, and its id() can be reassigned.

---

**9. What does this print?**

python

CopyEdit

```
print(is(10, 10))
```

A. True
B. False
C. Error
D. 10

**Answer:** C. Error

✅ *Explanation:* is is a **keyword**, not a function. You should use 10 is 10, not is(10, 10).

---

**10. Which of these can affect the id() value of an object?**

A. Reassigning the variable to a new object
B. Changing a mutable object in place
C. Interning of small integers and strings
D. All of the above

**Answer:** D. All of the above

✅ *Explanation:* Python memory management and optimization tricks can influence object identities.

# Python Integer Literals – MCQs

**1. Which of the following is a valid decimal integer literal in Python?**

A. 10.5<br>
B. 0x10<br>
C. 1234<br>
D. 0b1101

**Answer:** C. 1234

✅ *Explanation:* Decimal integer literals are written with digits only, no prefix or decimal point.

---

**2. What is the prefix for a binary integer literal in Python?**

A. 0x<br>
B. 0d<br>
C. 0b<br>
D. b0

**Answer:** C. 0b

✅ *Explanation:* Binary literals use the 0b or 0B prefix.

---

**3. Which of the following is not a valid integer literal in Python?**

A. 0x1A<br>
B. 0b102<br>
C. 0o77<br>
D. 100

**Answer:** B. 0b102

✅ *Explanation:* Binary literals can only contain 0 and 1.

---

**4. What does the literal 0x10 represent in decimal?**

A. 10<br>
B. 15<br>
C. 16<br>
D. 100

**Answer:** C. 16

✅ *Explanation:* 0x10 is a hexadecimal literal. 0x10 = 1*16 + 0 = 16.

---

**5. Which function converts a string "1010" to a binary integer?**

A. int("1010")<br>
B. int("1010", 2)<br>
C. bin("1010")<br>
D. str("1010")

**Answer:** B. int("1010", 2)

✅ *Explanation:* Specifies base 2 to convert binary string to decimal.

**6. What is the base of an octal literal like 0o17?**

A. 10<br>
B. 16<br>
C. 8<br>
D. 2

**Answer:** C. 8

✅ *Explanation:* Octal literals use the 0o prefix and base 8.

---

**7. Which of the following is a valid hexadecimal integer literal?**
A. 0xG1
B. 0x1F
C. 0h1A
D. #1A
**Answer:** B. 0x1F
✅ *Explanation:* Hex digits include 0-9 and A-F (or a-f), prefixed with 0x.

---

**8. What type does Python assign to 0xA, 0b10, and 0o7?**
A. float
B. str
C. complex
D. int
**Answer:** D. int
✅ *Explanation:* All these literals represent integers in different number systems.

---

**9. What is the decimal value of the binary literal 0b1111?**
A. 11
B. 14
C. 15
D. 16
**Answer:** C. 15
✅ *Explanation:* 0b1111 = 1×8 + 1×4 + 1×2 + 1 = 15.

---

**10. Which of these is the correct way to define a large integer in Python 3?**
A. 1_000_000
B. 1.000.000
C. 1,000,000
D. 1*10^6
**Answer:** A. 1_000_000
✅ *Explanation:* Python 3 allows underscores in numeric literals for readability.

## Python Type Casting – MCQs

**1. What is type casting in Python?**
A. Assigning data to a variable
B. Converting one data type to another
C. Casting variables into functions
D. Copying values from one variable to another
**Answer:** B. Converting one data type to another
✅ *Explanation:* Type casting changes a value's data type explicitly or implicitly.

---

**2. Which of the following is explicit type casting?**

A. a = 10

B. b = 3.5

C. c = int(3.7)

D. d = a + b

**Answer:** C. c = int(3.7)

✅ *Explanation:* You're explicitly converting a float to an int using int().

---

**3. What will be the output of int("123")?**

A. 123

B. "123"

C. None

D. Error

**Answer:** A. 123

✅ *Explanation:* The string is converted to an integer successfully.

---

**4. What is the result of int("abc")?**

A. "abc"

B. 0

C. Error

D. None

**Answer:** C. Error

✅ *Explanation:* You can't convert non-numeric strings to integers.

---

**5. What will float("12.34") return?**

A. "12.34"

B. 12

C. 12.34

D. Error

**Answer:** C. 12.34

✅ *Explanation:* The string represents a valid float and is converted correctly.

---

**6. What is the output of str(123)?**

A. 123

B. '123'

C. str

D. Error

**Answer:** B. '123'

✅ *Explanation:* It converts the integer into a string representation.

**7. Which of the following is not a valid type casting function in Python?**

A. int()

B. str()

C. bool()

D. convert()

**Answer:** D. convert()

✅ *Explanation:* convert() is not a built-in Python type casting function.

---

**8. What will be the result of bool(0)?**
A. True
B. False
C. 0
D. None
**Answer:** B. False

✅ *Explanation:* 0 is considered falsy in Python.

---

**9. What does complex(3) return?**
A. 3
B. 3+0j
C. 0+3j
D. Error
**Answer:** B. 3+0j

✅ *Explanation:* The real part is 3 and imaginary part is 0.

---

**10. What is the output of float(True)?**
A. 1.0
B. 0.0
C. True
D. Error
**Answer:** A. 1.0

✅ *Explanation:* True is equivalent to 1, so float(True) = 1.0.

## Python isinstance() Function – MCQs

**1. What does the isinstance() function do in Python?**
A. Checks if an object is of a specific data type
B. Checks if two variables are the same object
C. Checks if an object is callable
D. Checks if an object is iterable
**Answer:** A. Checks if an object is of a specific data type

✅ *Explanation:* isinstance() is used to check if an object is an instance of a class or a subclass.

---

**2. What is the syntax of the isinstance() function?**
A. isinstance(object, classinfo)
B. isinstance(object, class)
C. classinfo.isinstance(object)
D. object.isinstance(classinfo)
**Answer:** A. isinstance(object, classinfo)

✅ *Explanation:* The correct syntax is isinstance(object, classinfo), where object is the instance and classinfo can be a class, a tuple of classes, or subclasses.

---

**3. What will isinstance(5, int) return?**
A. True
B. False
C. Error
D. None
**Answer:** A. True

✅ *Explanation:* 5 is an integer, so isinstance(5, int) returns True.

---

**4. What will isinstance("Hello", str) return?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* "Hello" is a string, so isinstance("Hello", str) returns True.

---

**5. What will isinstance(10.5, int) return?**
A. True
B. False
C. None
D. Error
**Answer:** B. False

✅ *Explanation:* 10.5 is a float, not an integer, so it returns False.

---

**6. Can isinstance() be used to check if an object is an instance of a subclass?**
A. Yes
B. No
C. Only for built-in classes
D. Only for user-defined classes
**Answer:** A. Yes

✅ *Explanation:* isinstance() returns True for objects that are instances of the specified class or any of its subclasses.

---

**7. What will isinstance([1, 2, 3], (list, tuple)) return?**
A. True
B. False
C. Error
D. None
**Answer:** A. True

✅ *Explanation:* The object is a list, which is a member of the tuple (list, tuple), so it returns True.

---

**8. What will isinstance(3, (str, float)) return?**
A. True
B. False
C. Error
D. None
**Answer:** B. False

✅ *Explanation:* 3 is an integer, not a string or float, so it returns False.

---

**9. What will isinstance("Python", object) return?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* Every object in Python is an instance of the object class, so isinstance("Python", object) returns True.

---

**10. Which of the following is true about isinstance()?**
A. It can check if an object is an instance of multiple classes at once.
B. It only works with user-defined classes.
C. It raises an error if the class does not exist.
D. It can only check against built-in types.
**Answer:** A. It can check if an object is an instance of multiple classes at once.

✅ *Explanation:* isinstance() can check if an object is an instance of any class in a tuple of classes.

## Python Operators and Operands – MCQs

**1. In Python, what is an operand?**
A. An operator
B. A variable or value on which an operator works
C. A function that performs an operation
D. A keyword used for calculations
**Answer:** B. A variable or value on which an operator works

✅ *Explanation:* An operand is a value or variable that an operator acts upon.

---

**2. Which of the following is a valid arithmetic operator in Python?**
A. &&
B. //
C. ==
D. :=
**Answer:** B. //

✅ *Explanation:* // is the floor division operator, used to divide and return the quotient without the remainder.

---

**3. What is the result of the expression 5 + 2 * 3 in Python?**
A. 21
B. 11
C. 16
D. 17
**Answer:** B. 11

✅ *Explanation:* Python follows the order of operations (PEMDAS), so multiplication is done first: 2 * 3 = 6, and then 5 + 6 = 11.

---

**4. What is the output of x = 5 and y = 3; print(x ** y)?**
A. 8
B. 15
C. 125
D. 5
**Answer:** C. 125

✅ *Explanation:* ** is the exponentiation operator. 5 ** 3 equals 125.

---

**5. Which of the following is a comparison operator in Python?**
A. =
B. ==
C. +
D. +=
**Answer:** B. ==

✅ *Explanation:* == is used to compare equality between two values.

---

**6. What will be the result of 5 % 2 in Python?**
A. 2
B. 1
C. 0
D. 3
**Answer:** B. 1

✅ *Explanation:* The modulo operator % returns the remainder of the division. 5 % 2 = 1.

---

**7. What does the += operator do in Python?**
A. Adds two values and assigns the result to the left operand
B. Divides the left operand by the right operand
C. Compares two operands for equality
D. Multiplies the left operand by the right operand
**Answer:** A. Adds two values and assigns the result to the left operand

✅ *Explanation:* += is an **in-place addition** operator. It adds the right operand to the left operand and assigns the result to the left operand.

---

**8. What is the output of x = 3; y = 2; print(x // y)?**

A. 1.5

B. 1

C. 3

D. 0

**Answer:** B. 1

✅ *Explanation:* The // operator performs **floor division**, returning the quotient without the remainder (3 // 2 = 1).

---

**9. Which of the following operators is used for string concatenation in Python?**

A. +

B. &

C. ==

D. *

**Answer:** A. +

✅ *Explanation:* The + operator is used for string concatenation.

---

**10. Which of the following is not an assignment operator in Python?**

A. =

B. +=

C. -=

D. ==

**Answer:** D. ==

✅ *Explanation:* == is a comparison operator, not an assignment operator.

## Python Unary Operators – MCQs

**1. What is a unary operator in Python?**

A. An operator that requires two operands

B. An operator that requires only one operand

C. An operator that works on a class

D. An operator that performs logical operations

**Answer:** B. An operator that requires only one operand

✅ *Explanation:* A unary operator works with a single operand to perform an operation.

---

**2. Which of the following is a unary operator in Python?**

A. +

B. -

C. ++

D. *

**Answer:** B. -

✅ *Explanation:* The unary minus operator - negates the value of its operand.

---

**3. What will be the result of x = -5; print(+x)?**
A. -5
B. 5
C. Error
D. None
**Answer:** A. -5
✅ *Explanation:* The + unary operator does nothing to the value, so it simply returns -5.

---

**4. What is the output of x = -10; print(-x)?**
A. 10
B. -10
C. 0
D. None
**Answer:** A. 10
✅ *Explanation:* The unary minus operator - changes the sign of the operand. -(-10) becomes 10.

---

**5. Which of the following unary operators can be used to reverse the sign of a number in Python?**
A. *
B. -
C. +
D. /
**Answer:** B. -
✅ *Explanation:* The unary minus operator - reverses the sign of a number.

---

**6. What is the output of x = 5; print(~x)?**
A. 5
B. -5
C. -6
D. None
**Answer:** C. -6
✅ *Explanation:* The ~ operator performs a bitwise NOT operation. For integers, it inverts the bits, resulting in -6 for 5.

---

**7. Which unary operator is used to perform a bitwise negation in Python?**
A. ~
B. &
C. ^
D. |
**Answer:** A. ~
✅ *Explanation:* The ~ operator is a unary bitwise NOT operator that inverts the bits of the operand.

---

**8. What will x = 10; print(~x) output?**

A. -10

B. 10

C. 9

D. -11

**Answer:** D. -11

✅ *Explanation:* The ~ operator inverts the bits of 10, resulting in -11 in Python.

---

**9. What will be the output of x = 0; print(~x)?**

A. 0

B. -1

C. 1

D. None

**Answer:** B. -1

✅ *Explanation:* The bitwise NOT of 0 is -1 in Python.

---

**10. Which of the following will raise an error in Python?**

A. x = 5; print(+x)

B. x = 5; print(-x)

C. x = 5; print(~x)

D. x = 5; print(x++)

**Answer:** D. x = 5; print(x++)

✅ *Explanation:* Python does not support the ++ increment operator, unlike some other languages.

## Python Binary Operators – MCQs

**1. What is a binary operator in Python?**

A. An operator that requires no operands

B. An operator that requires only one operand

C. An operator that works with two operands

D. An operator that works with three operands

**Answer:** C. An operator that works with two operands

✅ *Explanation:* Binary operators work on two operands, performing an operation like addition, subtraction, etc.

---

**2. Which of the following is a valid binary operator in Python?**

A. +

B. ~

C. ++

D. -

**Answer:** A. +

✅ *Explanation:* + is a binary operator when used with two operands (e.g., a + b).

---

**3. What will be the result of 10 + 3 in Python?**
A. 13
B. 7
C. 30
D. None
**Answer:** A. 13
✅ *Explanation:* The + operator adds two operands, so 10 + 3 = 13.

---

**4. Which operator is used for exponentiation in Python?**
A. *
B. **
C. ^
D. //
**Answer:** B. **
✅ *Explanation:* The ** operator is used for exponentiation (e.g., 2 ** 3 = 8).

---

**5. What is the result of 7 // 3 in Python?**
A. 2.33
B. 2
C. 3
D. 1
**Answer:** B. 2
✅ *Explanation:* The // operator performs **floor division**, which returns the quotient rounded down to the nearest integer.

---

**6. Which of the following is a valid comparison (relational) binary operator in Python?**
A. =
B. ==
C. >
D. &
**Answer:** C. >
✅ *Explanation:* > is a comparison operator that checks if the left operand is greater than the right operand.

---

**7. What will be the output of 5 & 3 in Python?**
A. 7
B. 1
C. 6
D. None
**Answer:** B. 1
✅ *Explanation:* The & operator performs a **bitwise AND** operation, and 5 & 3 results in 1.

---

**8. Which of the following operators is used for logical AND in Python?**
A. &
B. |
C. and
D. &&
**Answer:** C. and
✅ *Explanation:* and is a logical operator in Python that returns True if both operands are True.

**9. What is the result of 4 ^ 5 in Python?**
A. 1
B. 9
C. 0
D. 3
**Answer:** A. 1
✅ *Explanation:* The ^ operator performs a **bitwise XOR** operation. For 4 ^ 5, the result is 1.

---

**10. What is the output of 10 == 10 in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True
✅ *Explanation:* The == operator checks if two operands are equal, so 10 == 10 returns True.

---

**11. What will the expression 8 | 4 return?**
A. 12
B. 4
C. 8
D. 5
**Answer:** A. 12
✅ *Explanation:* The | operator performs a **bitwise OR** operation. For 8 | 4, the result is 12.

---

**12. Which operator is used for floor division in Python?**
A. /
B. %
C. //
D. **
**Answer:** C. //
✅ *Explanation:* The // operator performs **floor division**, which divides and rounds the result down to the nearest integer.

## Python Arithmetic Operators – MCQs

**1. Which operator is used for addition in Python?**

A. -
B. *
C. +
D. /

**Answer:** C. +

✅ *Explanation:* The + operator is used for addition in Python.

---

**2. What will be the result of the expression 7 - 3 in Python?**

A. 4
B. 10
C. 0
D. 1

**Answer:** A. 4

✅ *Explanation:* The - operator subtracts the second operand from the first operand, so 7 - 3 = 4.

---

**3. Which operator is used to perform multiplication in Python?**

A. +
B. *
C. /
D. //

**Answer:** B. *

✅ *Explanation:* The * operator is used for multiplication in Python.

---

**4. What will be the result of the expression 6 * 2 in Python?**

A. 12
B. 8
C. 3
D. None

**Answer:** A. 12

✅ *Explanation:* The * operator multiplies the operands. 6 * 2 = 12.

---

**5. Which operator is used for division in Python?**

A. *
B. /
C. //
D. ^

**Answer:** B. /

✅ *Explanation:* The / operator is used for **true division**, which returns a float.

---

**6. What is the output of 9 / 2 in Python?**
A. 4
B. 4.5
C. 5
D. 3
**Answer:** B. 4.5

✅ *Explanation:* The / operator performs division and returns a floating-point result.

---

**7. Which operator performs floor division in Python?**
A. /
B. //
C. %
D. **
**Answer:** B. //

✅ *Explanation:* The // operator performs **floor division**, returning the quotient rounded down to the nearest integer.

---

**8. What is the result of 9 // 4 in Python?**
A. 3
B. 2.25
C. 2
D. 4
**Answer:** C. 2

✅ *Explanation:* The // operator performs floor division, and 9 // 4 = 2.

---

**9. Which operator is used to get the remainder of a division in Python?**
A. /
B. *
C. %
D. //
**Answer:** C. %

✅ *Explanation:* The % operator gives the **remainder** of a division.

---

**10. What will be the result of the expression 7 % 4 in Python?**
A. 2
B. 3
C. 1
D. 0
**Answer:** B. 3

✅ *Explanation:* The % operator calculates the remainder of the division. 7 % 4 = 3.

---

**11. Which operator is used for exponentiation in Python?**
A. *
B. +
C. ^
D. **
**Answer:** D. **

✅ *Explanation:* The ** operator is used for exponentiation (e.g., 2 ** 3 = 8).

---

**12. What is the output of 3 ** 2 in Python?**
A. 9
B. 6
C. 5
D. 3
**Answer:** A. 9

✅ *Explanation:* The ** operator calculates the exponentiation. 3 ** 2 = 9.

## Python Comparison Operators – MCQs

**1. Which of the following comparison operators in Python checks for equality?**
A. ==
B. !=
C. >
D. <
**Answer:** A. ==

✅ *Explanation:* The == operator checks if two values are equal.

---

**2. What will be the result of 10 != 5 in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* The != operator checks if two values are not equal. Since 10 != 5, it returns True.

---

**3. Which operator is used to check if two values are not equal in Python?**
A. ==
B. !=
C. >=
D. <=
**Answer:** B. !=

✅ *Explanation:* The != operator checks if two values are not equal.

---

**4. What will be the result of 5 > 3 in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* The > operator checks if the left operand is greater than the right operand. Since 5 > 3, it returns True.

---

**5. Which of the following comparison operators in Python checks if one value is greater than or equal to another?**
A. >
B. <
C. >=
D. ==
**Answer:** C. >=

✅ *Explanation:* The >= operator checks if the left operand is greater than or equal to the right operand.

---

**6. What will the expression 7 < 10 return in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* The < operator checks if the left operand is less than the right operand. Since 7 < 10, it returns True.

---

**7. What does the <= operator do in Python?**
A. Checks if two values are equal
B. Checks if one value is less than or equal to another
C. Checks if two values are not equal
D. Checks if one value is greater than or equal to another
**Answer:** B. Checks if one value is less than or equal to another

✅ *Explanation:* The <= operator checks if the left operand is less than or equal to the right operand.

---

**8. What will be the result of 5 == '5' in Python?**
A. True
B. False
C. Error
D. None
**Answer:** B. False

✅ *Explanation:* The == operator compares both value and type. Since 5 is an integer and '5' is a string, the comparison returns False.

---

**9. What will the expression 10 <= 10 return in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True

✅ *Explanation:* The <= operator checks if the left operand is less than or equal to the right operand. Since 10 <= 10, it returns True.

---

**10. Which of the following comparison operators would return True if the left value is equal to the right value?**
A. !=
B. >
C. <
D. ==
**Answer:** D. ==

✅ *Explanation:* The == operator checks if the left and right operands are equal, returning True if they are.

---

**11. What will 3 > 5 return in Python?**
A. True
B. False
C. None
D. Error
**Answer:** B. False

✅ *Explanation:* The > operator checks if the left operand is greater than the right operand. Since 3 > 5 is false, the result is False.

---

**12. Which of the following comparison operators can be used to check if two values are the same object in memory?**
A. ==
B. !=
C. is
D. <=
**Answer:** C. is

✅ *Explanation:* The is operator checks if two variables point to the same object in memory (identity comparison).

## Python Logical Operators – MCQs

**1. Which of the following is a logical AND operator in Python?**
A. &
B. and
C. &&
D. |
**Answer:** B. and

✅ *Explanation:* The and operator is used for logical AND operations in Python.

---

**2. What will be the result of True and False in Python?**
A. True
B. False
C. None
D. Error
**Answer:** B. False

✅ *Explanation:* The and operator returns True if both operands are True, otherwise False. Since one operand is False, the result is False.

---

**3. Which of the following is a logical OR operator in Python?**

A. &&

B. |

C. or

D. xor

**Answer:** C. or

✅ *Explanation:* The or operator is used for logical OR operations in Python.

---

**4. What will be the result of True or False in Python?**

A. True

B. False

C. None

D. Error

**Answer:** A. True

✅ *Explanation:* The or operator returns True if at least one of the operands is True. Since the first operand is True, the result is True.

---

**5. Which operator in Python is used for logical negation (NOT)?**

A. not

B. ~

C. and

D. or

**Answer:** A. not

✅ *Explanation:* The not operator is used to negate a boolean value.

---

**6. What will the result of not True be in Python?**

A. True

B. False

C. None

D. Error

**Answer:** B. False

✅ *Explanation:* The not operator inverts the boolean value. not True results in False.

---

**7. What is the result of False and True or True in Python?**

A. True

B. False

C. None

D. Error

**Answer:** A. True

✅ *Explanation:* Python evaluates logical operators based on precedence: False and True results in False, and False or True results in True.

---

**8. What will be the result of not (True and False) in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True
✅ *Explanation:* True and False results in False, and not False results in True.

---

**9. What will True or False and False return in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True
✅ *Explanation:* Python evaluates and before or. First, False and False gives False, and then True or False gives True.

---

**10. Which of the following is not a logical operator in Python?**
A. and
B. or
C. not
D. xor
**Answer:** D. xor
✅ *Explanation:* xor is not a built-in logical operator in Python. The correct logical operators are and, or, and not.

---

**11. What will be the result of not (False or False) in Python?**
A. True
B. False
C. None
D. Error
**Answer:** A. True
✅ *Explanation:* False or False results in False, and not False results in True.

---

**12. Which operator would you use to check if both conditions are true in Python?**
A. and
B. or
C. not
D. xor
**Answer:** A. and
✅ *Explanation:* The and operator returns True if both conditions are true.

# Python Assignment Operators – MCQs

**1. Which operator is used for assignment in Python?**

A. =<br>
B. ==<br>
C. :=<br>
D. =>

**Answer:** A. =

✅ *Explanation:* The = operator is used for basic assignment in Python (e.g., x = 10).

---

**2. What will be the value of x after the statement x += 5 if x = 10 initially?**

A. 15<br>
B. 5<br>
C. 10<br>
D. None

**Answer:** A. 15

✅ *Explanation:* The += operator adds the value on the right side to the variable on the left. x += 5 means x = x + 5, so the new value of x is 15.

---

**3. What does the -= operator do in Python?**

A. Subtracts and assigns the result to the variable<br>
B. Adds and assigns the result to the variable<br>
C. Multiplies and assigns the result to the variable<br>
D. Divides and assigns the result to the variable

**Answer:** A. Subtracts and assigns the result to the variable

✅ *Explanation:* The -= operator subtracts the value on the right side from the variable on the left and assigns the result to the variable.

---

**4. What will be the value of x after the statement x *= 3 if x = 4 initially?**

A. 7<br>
B. 12<br>
C. 3<br>
D. 4

**Answer:** B. 12

✅ *Explanation:* The *= operator multiplies the variable by the value on the right side. So, x *= 3 means x = x * 3, resulting in 12.

---

**5. Which of the following assignment operators divides and assigns the result to the variable in Python?**

A. *=<br>
B. +=<br>
C. -=<br>
D. /=

**Answer:** D. /=

✅ *Explanation:* The /= operator divides the variable on the left by the value on the right and assigns the result to the variable.

---

**6. What will be the result of the statement x %= 4 if x = 10?**
A. 2
B. 1
C. 10
D. 4
**Answer:** A. 2

✅ *Explanation:* The %= operator calculates the remainder of dividing x by 4. 10 % 4 gives a remainder of 2.

---

**7. What does the **= operator do in Python?**
A. Adds and assigns the result to the variable
B. Exponentiates and assigns the result to the variable
C. Divides and assigns the result to the variable
D. Modulo and assigns the result to the variable
**Answer:** B. Exponentiates and assigns the result to the variable

✅ *Explanation:* The **= operator performs exponentiation and assigns the result to the variable (e.g., x **= 3 means x = x ** 3).

---

**8. What will be the value of x after the statement x //= 2 if x = 7?**
A. 3
B. 2
C. 7
D. 14
**Answer:** A. 3

✅ *Explanation:* The //= operator performs floor division and assigns the result to the variable. 7 // 2 equals 3.

---

**9. Which of the following is a valid assignment operator in Python?**
A. *=
B. ==
C. ===
D. =>
**Answer:** A. *=

✅ *Explanation:* *= is a valid assignment operator used for multiplication assignment in Python.

---

**10. What is the result of x = 5 followed by x &= 3 if x = 5 initially?**
A. 5
B. 3
C. 4
D. 1
**Answer:** C. 4

✅ *Explanation:* The &= operator performs a **bitwise AND** between x and 3. 5 in binary is 101 and 3 is 011, so 101 & 011 = 001, which is 4.

---

**11. What is the result of the statement x := 10 in Python?**

A. It assigns 10 to x

B. It assigns x to 10

C. It raises an error

D. It returns a tuple (10, x)

**Answer:** A. It assigns 10 to x

✅ *Explanation:* The := operator is called the **walrus operator**, and it is used for assignment expressions. It assigns the value to x and also returns the assigned value.

---

**12. Which of the following operators is used for conditional assignment in Python?**

A. ==

B. :=

C. =

D. +=

**Answer:** B. :=

✅ *Explanation:* The := operator, also known as the **walrus operator**, is used in conditional assignments (e.g., if (n := len(arr)) > 5).

## Python Identity Operators – MCQs

**1. Which of the following is an identity operator in Python?**

A. ==

B. !=

C. is

D. and

**Answer:** ✅ C. is

**Explanation:** The is operator checks whether two variables refer to the same object in memory.

---

**2. What does the is operator check for in Python?**

A. Value equality

B. Memory location (object identity)

C. Data type

D. Syntax error

**Answer:** ✅ B. Memory location (object identity)

**Explanation:** is returns True if two variables point to the same object in memory.

---

**3. Which of the following is the opposite of the is operator in Python?**

A. !=

B. ==

C. not is

D. is not

**Answer:** ✅ D. is not

**Explanation:** is not checks if two variables **do not** refer to the same object in memory.

---

**4. What will be the output of the following code?**

python

CopyEdit

```
x = [1, 2, 3]
y = x
print(x is y)
```

A. True

B. False

C. Error

D. None

**Answer:** ✅ A. True

**Explanation:** y = x makes y and x point to the same list object, so x is y is True.

---

**5. What will be the output of the following code?**

python

CopyEdit

```
a = [1, 2]
b = [1, 2]
print(a is b)
```

A. True

B. False

C. Error

D. None

**Answer:** ✅ B. False

**Explanation:** Even though the contents are the same, a and b are different objects in memory, so a is b is False.

---

**6. Which of these comparisons checks whether two variables have the same contents?**

A. a is b

B. a == b

C. a is not b

D. a !== b

**Answer:** ✅ B. a == b

**Explanation:** == checks for **value equality**, not object identity.

---

**7. What will None is None evaluate to?**

A. True

B. False

C. Error

D. None

**Answer:** ✅ A. True

**Explanation:** None is a singleton object in Python, so any reference to None points to the same memory location.

---

**8. What is the result of the following code?**

python

CopyEdit

```
a = 256
b = 256
print(a is b)
```

A. True

B. False

C. None

D. Error

**Answer:** ✅ A. True

**Explanation:** Small integers (between -5 and 256) are **interned** in Python and refer to the same memory address.

---

**9. What is the result of the following code?**

python

CopyEdit

```
a = 300
b = 300
print(a is b)
```

A. True

B. False

C. None

D. Error

**Answer:** ✅ B. False

**Explanation:** Integers greater than 256 are not guaranteed to be interned, so a and b may not be the same object.

---

**10. Identity operators can be most reliably used to compare:**

A. Lists

B. Dictionaries

C. Strings

D. None

**Answer:** ✅ D. None

**Explanation:** Use is and is not for comparisons with None, as None is a singleton in Python.

## Python Membership Operators – MCQs

**1. Which of the following is a membership operator in Python?**

A. in

B. is

C. ==

D. !=

**Answer:** ✅ A. in

**Explanation:** The in operator checks if a value exists in a sequence.

---

**2. What will be the output of the following code?**

python

CopyEdit

```
x = [10, 20, 30]
print(20 in x)
```

A. True

B. False

C. Error

D. None

**Answer:** ✅ A. True

**Explanation:** 20 is an element of the list x, so the output is True.

---

**3. Which of the following checks if a value does not exist in a sequence?**

A. not

B. !=

C. is not

D. not in

**Answer:** ✅ D. not in

**Explanation:** The not in operator returns True if the value is **not** present in the sequence.

---

**4. What will be the output of the following code?**

python

CopyEdit

```
string = "hello"
print("e" in string)
```

A. True

B. False

C. Error

D. None

**Answer:** ✅ A. True

**Explanation:** The character 'e' is present in the string 'hello'.

---

**5. What will the following code return?**

python

CopyEdit

```
nums = (1, 2, 3, 4)
print(5 in nums)
```

A. True

B. False

C. Error

D. None

**Answer:** ✅ B. False

**Explanation:** 5 is not present in the tuple nums.

---

**6. Which of the following is the correct use of not in operator?**

A. 10 not in [1, 2, 3]
B. not in 10 [1, 2, 3]
C. 10 !in [1, 2, 3]
D. 10 !== [1, 2, 3]

**Answer:** ✅ A. 10 not in [1, 2, 3]

**Explanation:** This is the correct syntax for checking that 10 is not in the list.

---

**7. What is the result of 'apple' in {'apple': 1, 'banana': 2}?**

A. True
B. False
C. Error
D. None

**Answer:** ✅ A. True

**Explanation:** The in operator checks keys in a dictionary. 'apple' is a key, so it returns True.

---

**8. What does in check for when used with a dictionary?**

A. Keys
B. Values
C. Both
D. Types

**Answer:** ✅ A. Keys

**Explanation:** Membership test using in with a dictionary only checks **keys**, not values.

---

**9. Which of the following will return False?**

A. "a" in "apple"
B. 2 in [1, 2, 3]
C. 4 not in (1, 2, 3)
D. 3 in {1, 2, 4}

**Answer:** ✅ D. 3 in {1, 2, 4}

**Explanation:** 3 is not in the set, so the expression returns False.

---

**10. What is the result of this code?**

python
CopyEdit

```
s = "banana"
print("na" in s)
```

A. True
B. False
C. Error
D. None

**Answer:** ✅ A. True

**Explanation:** "na" is a substring in "banana", so the result is True.

# Python Keywords – MCQs

**1. Which of the following is a valid Python keyword?**

A. define

B. function

C. def

D. fun

**Answer:** ✅ C. def

**Explanation:** def is a keyword used to define a function in Python.

---

**2. What will be the result of using a keyword as a variable name?**

A. It will execute normally

B. It will print the keyword

C. It will raise a SyntaxError

D. It will convert the keyword to a string

**Answer:** ✅ C. It will raise a SyntaxError

**Explanation:** Keywords cannot be used as variable names because they are reserved.

---

**3. Which of the following is not a keyword in Python?**

A. elif

B. while

C. lambda

D. loop

**Answer:** ✅ D. loop

**Explanation:** loop is not a Python keyword. The others are valid Python keywords.

---

**4. What is the purpose of the pass keyword in Python?**

A. To stop a loop

B. To exit a function

C. To do nothing (a placeholder)

D. To pass control to another block

**Answer:** ✅ C. To do nothing (a placeholder)

**Explanation:** pass is used when a statement is syntactically required but no action is needed.

---

**5. Which keyword is used to create a class in Python?**

A. class

B. define

C. struct

D. object

**Answer:** ✅ A. class

**Explanation:** class is the keyword used to define a new class.

---

**6. How can you check the list of all Python keywords programmatically?**

A. help(keywords)

B. list(keywords)

C. print(keywords())

D. import keyword; print(keyword.kwlist)

**Answer:** ✅ D. import keyword; print(keyword.kwlist)

**Explanation:** The keyword module in Python provides a list of all keywords via kwlist.

---

**7. What is the role of the yield keyword in Python?**
A. Returns a value and exits the function
B. Pauses the function and returns a generator
C. Repeats the function
D. Calls the next function in line

**Answer:** ✅ B. Pauses the function and returns a generator
**Explanation:** yield is used in generator functions to pause and return a value, maintaining state.

---

**8. Which of the following keywords is used for exception handling in Python?**
A. error
B. try
C. fail
D. exit

**Answer:** ✅ B. try
**Explanation:** try is used to start a block of code that will be tested for errors.

---

**9. Which keyword is used to define an anonymous function in Python?**
A. def
B. lambda
C. func
D. anon

**Answer:** ✅ B. lambda
**Explanation:** lambda is used to define small anonymous functions.

---

**10. Which of the following are keywords in Python?**
*(Select all that apply)*
A. assert
B. finally
C. return
D. include

**Answer:** ✅ A, B, C
**Explanation:** assert, finally, and return are all Python keywords. include is not.

## Python Variables – MCQs

**1. Which of the following is a valid variable name in Python?**
A. 2name
B. first-name
C. name_1
D. class

**Answer:** ✅ C. name_1
**Explanation:** Variable names must start with a letter or underscore and cannot be a Python keyword like class.

---

**2. What will be the output of the following code?**

python

CopyEdit

```
x = 10
y = "10"
print(x == y)
```

A. True

B. False

C. 10

D. Error

**Answer:** ✅ B. False

**Explanation:** x is an integer, and y is a string, so their values are not equal.

---

**3. What is the correct way to assign multiple variables in one line in Python?**

A. x = y = z = 10

B. x, y, z = 10, 20, 30

C. Both A and B

D. None of the above

**Answer:** ✅ C. Both A and B

**Explanation:** Both assignments are valid: one assigns the same value, and the other assigns different values.

---

**4. Which of these variable names is not allowed in Python?**

A. _value

B. value2

C. my value

D. value_2

**Answer:** ✅ C. my value

**Explanation:** Variable names cannot contain spaces.

---

**5. What will the following code output?**

python

CopyEdit

```
a = 5
A = 10
print(a + A)
```

A. 15

B. 10

C. 5

D. Error

**Answer:** ✅ A. 15

**Explanation:** Python is case-sensitive, so a and A are different variables.

---

**6. Which of the following statements is true about variable declaration in Python?**

A. Data type must be declared

B. Python does not support variables

C. Variables must be declared using var keyword

D. Variables are created automatically when a value is assigned

**Answer:** ✅ D. Variables are created automatically when a value is assigned

**Explanation:** Python uses dynamic typing and does not require explicit variable declarations.

---

**7. What will the following code print?**

python

CopyEdit

```
x = "Python"
x = 123
print(x)
```

A. Python

B. 123

C. Error

D. x

**Answer:** ✅ B. 123

**Explanation:** The second assignment overwrites the first. Now x holds the integer 123.

---

**8. What does the del keyword do in Python?**

A. Deletes the last value of a list

B. Deletes a variable

C. Declares a variable

D. Defines a function

**Answer:** ✅ B. Deletes a variable

**Explanation:** del is used to delete variables or elements from data structures.

---

**9. Which of the following best describes a variable in Python?**

A. A fixed value

B. A memory location that stores a value

C. A function name

D. A reserved keyword

**Answer:** ✅ B. A memory location that stores a value

**Explanation:** A variable is used to store data in memory during program execution.

---

**10. What is the type of variable x after this code runs?**

python

CopyEdit

```
x = 5.0
```

A. int

B. float

C. str

D. double

**Answer:** ✅ B. float

**Explanation:** The value 5.0 is a floating-point number, so x is of type float.

# Python Naming Conventions – MCQs

**1. Which of the following is a valid Python variable name as per naming conventions?**

A. 2value
B. value_2
C. my-value
D. def

**Answer:** ✅ B. value_2

**Explanation:** Variable names must not begin with a number, cannot have hyphens, and cannot be Python keywords.

---

**2. Which naming style is recommended for functions in Python?**

A. myFunction
B. MyFunction
C. my_function
D. My_function

**Answer:** ✅ C. my_function

**Explanation:** Python uses **snake_case** for function names.

---

**3. What naming convention should be used for class names in Python?**

A. snake_case
B. UPPERCASE
C. camelCase
D. PascalCase (also called CapWords)

**Answer:** ✅ D. PascalCase

**Explanation:** Class names should use PascalCase as per PEP 8.

---

**4. Which of the following is an appropriate constant name?**

A. piValue
B. Pi_Value
C. PI_VALUE
D. pi_value

**Answer:** ✅ C. PI_VALUE

**Explanation:** Constants are usually written in **UPPER_SNAKE_CASE**.

---

**5. Which naming convention is used for private variables or methods?**

A. Start with @
B. Start with __
C. Start with _
D. End with $

**Answer:** ✅ C. Start with _

**Explanation:** A single leading underscore _var indicates a "protected" or internal use variable by convention.

---

**6. What does a double underscore prefix (e.g., __var) indicate in Python?**
A. A keyword
B. A public variable
C. Name mangling (to prevent name clashes in subclasses)
D. A constant
**Answer:** ✅ C. Name mangling (to prevent name clashes in subclasses)
**Explanation:** Double leading underscores trigger name mangling to protect variable access in classes.

---

**7. What is the naming convention for module names in Python?**
A. PascalCase
B. camelCase
C. snake_case
D. UPPERCASE
**Answer:** ✅ C. snake_case
**Explanation:** Modules should be named in all lowercase with optional underscores.

---

**8. What will happen if you use a Python keyword as a variable name?**
A. It will execute normally
B. It will give a runtime warning
C. It will raise a SyntaxError
D. It will be ignored
**Answer:** ✅ C. It will raise a SyntaxError
**Explanation:** Python keywords are reserved and cannot be used as identifiers.

---

**9. Which is the correct naming convention for a function that calculates an area?**
A. calculateArea()
B. CalculateArea()
C. calculate_area()
D. calculate-area()
**Answer:** ✅ C. calculate_area()
**Explanation:** Functions should use **snake_case** to follow Python's PEP 8 style guide.

---

**10. According to Python naming conventions, which of the following is best for a global constant?**
A. value = 100
B. Value = 100
C. VALUE = 100
D. valueConstant = 100
**Answer:** ✅ C. VALUE = 100
**Explanation:** Constants should be written in uppercase with underscores separating words