CLASS -10 (2025-26)

**Operators in Java**

**CHAPTER 4**

**Assignments:-**

**A. Tick (✓) the correct answer.**

1. The = operator is an example of which operator?  
   a. Relational  
   b. Logical  
   c. Arithmetic  
   d. Assignment  
   **Answer:- d. Assignment**
2. Which of the following is an example of a postfix increment operator?  
   a. a+  
   b. a++  
   c. ++a  
   d. +++a  
   **Answer:- b. a++**
3. Which of the following is an example of a prefix decrement operator?  
   a. ++  
   b. a-  
   c. -a  
   d. ++a  
   **Answer:- c. -a**
4. Which of the following is the correct use of a ternary operator?  
   a. (a > b) 7^ prime prime a is greater than b": "b is greater than a";  
   b. (a > b) "a is greater than b"? "b is greater than a";  
   c. Both a & b  
   d. (a > b) ? "a is greater than b" : "b is greater than a";  
   **Answer:- d. (a > b) ? "a is greater than b" : "b is greater than a";**
5. Which of the following operators can we use to initialize all non-primitive data types?  
   a. (dot) operator  
   b. Ternary operator  
   c. new operator  
   d. relational operator  
   **Answer:- c. new operator**

**B. Fill in the blanks.**

1. Arrange these operators (<, ++, +, %) in order of higher precedence to lower precedence  
   **Answer:- ++, %, +, <**
2. The equivalent Java expression for a² + b² + 2ab is  
   **Answer:- a\*a *+* b\*b + 2\**a\**b**
3. The output of the expression a += a++ \* ++a % a is if a is 5.  
   **Answer:- 30**
4. The expression (true) || (true) will return.......  
   **Answer:- true**
5. The expression 10 % 3 will return..........  
   **Answer:- 1**

**C. Short Answer type question**

**1. What is the output of the following expressions if executed sequentially? Where a = 10, b = 2 and c = 8.**

* c += a / b \* c
* a = c + b++ \* (a + b + c)

**Answer:-**  
Step-by-step:

* Initially: a = 10, b = 2, c = 8

**First expression:**   
c += a / b \* c  
=> c = c + (a / b \* c)  
=> c = 8 + (10 / 2 \* 8)  
=> c = 8 + (5 \* 8) = 8 + 40 = 48

Now: c = 48, b = 2, a = 10

**Second expression:**  
a = c + b++ \* (a + b + c)  
=> Use b = 2, but b++ means use 2 then increment to 3  
=> a = 48 + 2 \* (10 + 3 + 48)  
=> a = 48 + 2 \* 61 = 48 + 122 = 170

**Final values:** a = 170, b = 3, c = 48

**2. What will be the output of the following ternary expression if int a = 5, b = 3 and double d?**  
d = (a >= b) ? (a + b) : (a \* b);

**Answer:-**  
a = 5, b = 3  
a >= b is true  
So, d = a + b = 5 + 3 = 8

**Answer:- 8.0**

**3. What is the difference between the ternary operator and the unary operator? Give one example of each.**

**Answer:-**

* **Ternary operator** evaluates a condition and returns one of two values:  
  Syntax: (condition) ? value\_if\_true : value\_if\_false  
  **Example:** int max = (a > b) ? a : b;
* **Unary operator** operates on a single operand to change its value.  
  **Example:** ++a; (increments a by 1)

**4. Write the Java expressions of the following mathematical expressions:**

a. **A = (B + C) / 2 × h**  
**Answer:-** A = (B + C) / 2 \* h;

b. **V = πr² × h**  
**Answer:-** V = Math.PI \* r \* r \* h;

**5. Name the operators listed below:**

a. >=  
**Answer:- Relational operator**

b. !=  
**Answer:- Relational operator**

c. --  
**Answer:- Unary decrement operator**

d. +=  
**Answer:- Compound assignment operator**

e. %  
**Answer:- Arithmetic (modulus) operator**

f. ||  
**Answer:- Logical OR operator**

**6. Give the output of the following expressions:**

a. a = ++a + a-- / ++a + -a ; when a = 2  
**Answer:-**  
Step-by-step:  
a = ++a + a-- / ++a + -a  
Initial a = 2

* ++a → 3
* a-- → use 3, then becomes 2
* ++a → 3
* -a → -3

Now expression becomes:  
a = 3 + 3 / 3 + (-3)  
=> a = 3 + 1 + (-3) = 1

**Answer:- 1**

b. i \*= j++ % j-- / k \* 10; when i = 2, j = 4, k = 3  
Step-by-step:

* j++ = 4 (j becomes 5)
* j-- = 5 (used, then becomes 4)
* So expression:  
  i \*= 4 % 5 / 3 \* 10 = 4 / 3 \* 10 = 1 \* 10 = 10
* i = 2 \* 10 = 20

**Answer:- 20**

**Assertion and Reason type questions**

**1.**  
**Assertion (A):** The expression a = ++a + a-- / ++a + -a gives the output 1 when a = 2.  
**Reason (R):** Pre-increment and post-decrement operators affect the variable differently during evaluation.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- a**

**2.**  
**Assertion (A):** The ternary operator returns one of two values depending on the condition.  
**Reason (R):** The syntax of ternary operator is (condition) ? value\_if\_false : value\_if\_true.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- c**

**3.**  
**Assertion (A):** The output of d = (a >= b) ? (a + b) : (a \* b) is 8.0 when a = 5 and b = 3.  
**Reason (R):** Since a is greater than b, the ternary operator evaluates the false branch.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- c**

**4.**  
**Assertion (A):** The new operator is used to allocate memory to non-primitive data types in Java.  
**Reason (R):** The new operator is used to create instances of classes and arrays.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- a**

**5.**  
**Assertion (A):** The expression 10 % 3 evaluates to 1 in Java.  
**Reason (R):** The modulus operator returns the quotient of the division.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- c**

**6.**  
**Assertion (A):** The expression (true) || (true) returns true.  
**Reason (R):** The || operator returns false only if both conditions are true.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- c**

**7.**  
**Assertion (A):** The operator >= is used to compare two values in Java.  
**Reason (R):** The >= operator is an arithmetic operator.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- c**

**8.**  
**Assertion (A):** The expression c += a / b \* c updates the value of c to 48 when a = 10, b = 2, c = 8.  
**Reason (R):** Operator precedence ensures division and multiplication are performed before addition.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- a**

**9.**  
**Assertion (A):** ++, --, and ! are examples of unary operators in Java.  
**Reason (R):** Unary operators operate on a single operand.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- a**

**10.**  
**Assertion (A):** The Java expression for V = πr² × h is V = Math.PI \* r \* r \* h;  
**Reason (R):** In Java, π is written as Math.PI and exponentiation is performed using r \* r.  
**Options:**  
a) Both A and R are true, and R is the correct explanation of A  
b) Both A and R are true, but R is not the correct explanation of A  
c) A is true but R is false  
d) A is false but R is true  
**Answer:- a**

**"What is the output..."**

**1. What is the output of the following expression if a = 10, b = 2, c = 5?**  
c += a / ++b \* c;  
**Answer:-**  
b = 3, so c = c + (10 / 3 \* 5) = 5 + (3 \* 5) = 5 + 15 = 20

**2. What is the output of the following if a = 5, b = 2?**  
int x = a++ + ++b;  
**Answer:-**  
x = 5 + 3 = 8, a becomes 6, b becomes 3

**3. What is the output of the expression if x = 4, y = 2?**  
int z = x++ \* --y + x;  
**Answer:-**  
z = 4 \* 1 + 5 = 4 + 5 = 9

**4. What is the output if a = 3 and b = 6?**  
int result = a++ + b-- + ++a + --b;  
**Answer:-**  
result = 3 + 6 + 5 + 4 = 18

**5. What will be the result if x = 2, y = 3, z = 4?**  
int res = x + y \* z % x;  
**Answer:-**  
res = 2 + (3 \* 4) % 2 = 2 + 12 % 2 = 2 + 0 = 2

**6. What is the output if a = 2, b = 3?**  
int c = ++a \* b-- + --b;  
**Answer:-**  
c = 3 \* 3 + 1 = 9 + 1 = 10

**7. What will be the output if a = 6, b = 4, c = 2?**  
int x = a / b + c \* b;  
**Answer:-**  
x = 6 / 4 + 2 \* 4 = 1 + 8 = 9

**8. What is the output of the following if x = 10, y = 5?**  
int z = x % y + x / y;  
**Answer:-**  
z = 10 % 5 + 10 / 5 = 0 + 2 = 2

**9. What is the result if m = 8, n = 3?**  
int res = m-- - ++n + m;  
**Answer:-**  
res = 8 - 4 + 7 = 11

**10. What will be the value of res if a = 2, b = 4, c = 3?**   
int res = a \* b + c++ / --a;  
**Answer:-**  
res = 2 \* 4 + 3 / 1 = 8 + 3 = 11

**11. What is the output if a = 10, b = 5?**  
int result = (a % 2 == 0) ? a / b : b / a;  
**Answer:-**  
a % 2 == 0 → true → 10 / 5 = 2  
**Result = 2**

**12. What is the output if x = 7, y = 3?**  
int res = (x % y > 1) ? x \* y : x + y;  
**Answer:-**  
7 % 3 = 1 → not greater than 1 → false → 7 + 3 = 10  
**Result = 10**

**13. What is the output if a = 6, b = 2?**  
int result = (a / b == 3) ? a + b : a - b;  
**Answer:-**  
6 / 2 = 3 → true → 6 + 2 = 8  
**Result = 8**

**14. What is the output if a = 9, b = 4?**  
int res = a % b + b % a;  
**Answer:-**  
9 % 4 = 1, 4 % 9 = 4 → 1 + 4 = 5  
**Result = 5**

**15. What is the output if x = 12, y = 5?**  
int result = (x % y == 2) ? x - y : x + y;  
**Answer:-**  
12 % 5 = 2 → true → 12 - 5 = 7  
**Result = 7**

**16. What is the output if a = 15, b = 3?**  
int result = a % b \* (a / b);  
**Answer:-**  
15 % 3 = 0, 15 / 3 = 5 → 0 \* 5 = 0  
**Result = 0**

**17. What is the output if m = 10, n = 4?**  
int result = (m / n > 2) ? m % n : n % m;  
**Answer:-**  
10 / 4 = 2 → not greater → false → 4 % 10 = 4  
**Result = 4**

**18. What is the output if a = 8, b = 2, c = 3?**  
int result = (a % b == 0) ? (a / c) : (a \* c);  
**Answer:-**  
8 % 2 = 0 → true → 8 / 3 = 2 (integer division)  
**Result = 2**

**19. What is the output if x = 5, y = 2?**  
int res = (x % y == 1) ? x \* y : x + y;  
**Answer:-**  
5 % 2 = 1 → true → 5 \* 2 = 10  
**Result = 10**

**20. What is the output if a = 20, b = 7?**  
int result = (a / b % 2 == 0) ? a + b : a - b;  
**Answer:-**  
20 / 7 = 2, 2 % 2 = 0 → true → 20 + 7 = 27  
**Result = 27**

**21. What is the output if a = 5, b = 2?**  
int result = (++a % b == 0) ? a / b : a \* b;  
**Answer:-**  
++a = 6, 6 % 2 = 0 → true → 6 / 2 = 3  
**Result = 3**

**22. What is the output if x = 9, y = 3?**  
int res = (--x / y > 2) ? x % y : y % x;  
**Answer:-**  
--x = 8, 8 / 3 = 2 → not greater → false → 3 % 8 = 3  
**Result = 3**

**23. What is the output if a = 7, b = 3?**  
int result = (a++ % --b == 1) ? a + b : a - b;  
**Answer:-**  
--b = 2, a++ = 7 (then a=8), 7 % 2 = 1 → true → 8 + 2 = 10  
**Result = 10**

**24. What is the output if m = 6, n = 2?**  
int res = (++m / ++n == 3) ? m % n : m + n;  
**Answer:-**  
++m = 7, ++n = 3, 7 / 3 = 2 → false → 7 + 3 = 10  
**Result = 10**

**25. What is the output if x = 10, y = 5?**  
int result = (--x % y == 0) ? x++ / y : x-- \* y;  
**Answer:-**  
--x = 9, 9 % 5 = 4 → false → x-- = 9, x becomes 8, 9 \* 5 = 45  
**Result = 45**

**26. What is the output if a = 4, b = 2?**  
int res = (++a % b == 1) ? a-- + b : --a \* b;  
**Answer:-**  
++a = 5, 5 % 2 = 1 → true → a-- + b = 5 + 2 = 7, then a = 4  
**Result = 7**

**27. What is the output if a = 3, b = 2?**  
int result = (a++ % ++b == 1) ? ++a : --b;  
**Answer:-**  
a++ = 3 (a=4), ++b = 3, 3 % 3 = 0 → false → --b = 2  
**Result = 2**

**28. What is the output if x = 8, y = 3?**  
int res = (++x / --y < 3) ? x++ : y--;  
**Answer:-**   
++x = 9, --y = 2, 9 / 2 = 4 → false → y-- = 2, then y = 1  
**Result = 2**

**29. What is the output if a = 10, b = 4?**  
int result = (--a / b > 2) ? a-- % b : ++b;  
**Answer:-**  
--a = 9, 9 / 4 = 2 → not greater → false → ++b = 5  
**Result = 5**

**30. What is the output if m = 6, n = 3?**  
int res = (++m % --n == 1) ? m++ / n : m-- \* n;  
**Answer:-**  
++m = 7, --n = 2, 7 % 2 = 1 → true → m++ = 7 / 2 = 3, then m = 8  
**Result = 3**

**One-word question-answer pairs based on the chapter "Operators in Java":**

**1. Question:** Operator used to assign a value?  
**Answer:** Assignment

**2. Question:** Operator that checks equality?  
**Answer:** = =

**3. Question:** Increment operator?  
**Answer:** ++

**4. Question:** Logical AND operator?  
**Answer:** &&

**5. Question:** Ternary operator symbol?  
**Answer:** ?:

**6. Question:** Operator for remainder?  
**Answer:** %

**7. Question:** Operator used to create objects?  
**Answer:** new

**8. Question:** Unary operator for negation?  
**Answer:** -

**9. Question:** Relational operator for not equal?  
**Answer:** !=

**10. Question:** Logical OR operator?  
**Answer:** ||

**Short answer questions**

**1. Question:** What is an operator in Java?  
**Answer:** An operator is a symbol that performs an operation on variables and values.

**2. Question:** What does the ++ operator do?  
**Answer:** It increments the value of a variable by 1.

**3. Question:** What is the difference between == and =?  
**Answer:** == is a comparison operator, while = is an assignment operator.

**4. Question:** What type of operator is ?: in Java?  
**Answer:** It is a ternary operator.

**5. Question:** Which operator is used to find the remainder?  
**Answer:** The modulus operator %.

**6. Question:** What is the use of the new operator in Java?  
**Answer:** It is used to create objects of a class.

**7. Question:** Name any two relational operators in Java.  
**Answer:** >, <, >=, <=, ==, !=

**8. Question:** What will be the output of 10 / 3 in Java?  
**Answer:** 3 (Integer division)

**9. Question:** What does the -- operator do?  
**Answer:** It decrements the value of a variable by 1.

**10. Question:** Can logical operators be used with non-boolean values in Java?  
**Answer:** No, logical operators like &&, ||, and ! are used only with boolean values.

**11. Question:** What type of operator is += in Java?  
**Answer:** It is a compound assignment operator.

**12. Question:** What is the result of the expression true || false?  
**Answer:** true

**13. Question:** What is the precedence of the / operator compared to +?  
**Answer:** / has higher precedence than +.

**14. Question:** Which operator is used to compare two values for inequality?  
**Answer:** !=

**15. Question:** How many operands does a unary operator work with?  
**Answer:** One operand.

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