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 $a^2 + b^2 + 2ab$ 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.

****