Operators in Java 3: Increment and Decrement

Lesson 3

Increment and Decrement Operators ++  --

1. What are the increment and decrement operators? Write examples also.

The increment and decrement operators are ++ and -. These are used to increment by 1 and decrement by 1.

Note: These are also known as counters.

++a means a=a+1  Initially if a=7 then ++a is a=7+1. So a=8.
- - a means a=a-1  Initially if a=7 then -a is a=7-1. So a=6.

Prefix and Postfix

2. What are the two forms of increment decrement operators?

Prefix operation and postfix operation are two forms of increment and decrement operators.

E.g.: Prefix : ++a, --a

Postfix : a++, a--

3. Difference in prefix and postfix operations

Prefix: First increments or decrements then use the value. (Change then use)

E.g: int a = 7;
    int b = ++a + a;
    b = 8 + 8     //The 7 of a changes before addition
    b = 16

The value of b is 16

Postfix: First use the value then increments or decrements. (Use then change)

E.g: int a = 7;
    int b = a++ + a;
    b = 7 + 8     //The 7 of a changes to 8 after taking for addition
    b = 15

The value of b is 15

Practice Exercises

4. Write working and find the value of a: Initially always x = 7

Problems

1. a = ++x;
   Working and Answer
   7+1 8

2. a = x++;
   Working and Answer
   7 7

3. a = ++x + x;
   Answer
   8+8 16

4. a = x++ + x;
   Answer
   7_8+8 15
5. Write working and find the value of \( a \). Initially always \( x = 7 \).

1. \( a = --x; \)
   \hspace{1cm} \text{Working and Answer}
   \hspace{1cm} 7 - 1 \hspace{1cm} 6

2. \( a = x--; \)
   \hspace{1cm} \text{Working and Answer}
   \hspace{1cm} 7 \hspace{1cm} 7

3. \( a = --x + x; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 6 + 6 \hspace{1cm} 12

4. \( a = x-- + x; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 7 + 6 \hspace{1cm} 13

5. \( a = --x + x--; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 6 + 6 \hspace{1cm} 12

6. \( a = --x + --x; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 6 + 5 \hspace{1cm} 11

7. \( a = x-- + --x; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 7 + 5 \hspace{1cm} 12

8. \( a = x-- + x--; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 7 + 6 \hspace{1cm} 13

9. \( a = --x + x-- + x; \)
   \hspace{1cm} \text{Answer}
   \hspace{1cm} 6 + 6 + 5 \hspace{1cm} 17

10. \( a = --x + --x + x; \)
    \hspace{1cm} \text{Answer}
    \hspace{1cm} 6 + 5 + 5 \hspace{1cm} 16
11. \( a=x-- + x-- + x \);
   Answer
   \( 7_6 + 6_5 + 5 \quad 18 \)

12. \( a=x-- + --x + x \);
   Answer
   \( 7_6 + 5 + 5 \quad 17 \)

6. What is the output?

1. int \( x = 20 \);
   System.out.println(++\( x \));
   System.out.println(\( x \));
   Answer
   21
   21

2. int \( x = 20 \);
   System.out.println(\( x++ \));
   System.out.println(\( x \));
   Answer
   20
   21

3. int \( x = 20 \);
   System.out.println(\( x=x+1 \));
   System.out.println(\( x \));
   Answer
   21
   21

4. int \( x = 20 \);
   System.out.println(\( x+1 \));
   System.out.println(\( x \));
   Answer
   21
   20

5. char \( ch='A' \);
   \( ch=++ch \);
   System.out.println(ch);
   Answer
   B

6. char \( ch='A' \);
   \( ch=ch++ \);
   System.out.println(ch);
   Answer
   A

7. char \( ch='A' \);
   \( ch++ \);
   System.out.println(ch);
   Answer
   B

8. char \( ch='A' \);
   System.out.println(ch++);
   System.out.println(ch);
   Answer
   A
   B
7. **++ and -- have higher precedence than + / - *%**
   ```
   int a=5, b=7, c; Write value of c
   c = a++ + b + a; // The ++ acts first so it is with a++.  
   = 5 + 7 + 6  
   = 18
   c = 18
   ```

8. **Values of variables are assigned one by one**
   ```
   int a=3, c;
   c = a++ + a + a;  // At first value of a is 3 itself
   = 3 + 2 + 2
   = 7
   c = 7
   ```

9. **+= -= *= /= %= have lower precedence than ++ -- operators and + / - */ / %**
   ```
   1. int a=2;
      a* = ++a + a;  
      a = a * (++a + a) Practice using ( )
      = 2 * (3 + 3)
      = 2 * 6
      = 12
      a = 12
   2. int a=2;
      a* = ++a + a;
      a = a * (++a + a)
      = 2 * (2 + 3)
      = 2 * 5
      = 10
      a = 10
   ```

10. The = and += -= *= /= %= have lowest precedence. The right side operator will execute first.

    **E.g. 1:**
    ```
    a=2, b=3, c=4, d=5;
    a=b+c++*++d; What is value of a and b?
    Working
    a=b+c++*++d
    a=b+(c++*++d) (Expansion)
    a=b+3+(4*6)
    b=3+24
    b=27
    a=b
    a=27
    Value of a=27, b=27
    ```

    **E.g. 2:**
    ```
    a=2, b=3, c=4, d=5;
    a=+b=c++*++d; Write values of a and b.
    Working
    a=+b=c++*++d;
    a=+b=(c++*++d) (Expansion)
    a=a+b=(4*6) (Expansion)
    b=24
    a=a+b
    a=2+24
    a=26
    Value of a=26, b=24
    ```

    **E.g. 3:**
    ```
    a=3, b=4, c=9, d=3;
    a=+b=c++/++d; Write values of a and b.
    Working
    a=+b=c++/++d;
    a=+b=(c++/++d) (Expansion)
    a=a-b=(9/4)
    b=2
    a=a-b
    a=3-2
    a=1
    Value of a=1, b=2
    ```