ARITHMETIC OPERATORS

C++ BASICS

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TOPIC OUTLINE

Addition

Subtraction

Multiplication

Division

Modulo

Increment

Decrement

ARITHMETIC OPERATORS

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Arithmetic operators are used to perform **basic mathematical operations** on numeric values. These operators are fundamental to performing calculations and manipulating data in programs.

Unary Operators operates with a single operand (e.g., `++`, `--`).

Binary Operators operates with two operands (e.g., `+`, `-`, `*`, `%`).

ADDITION

Example:

```
int a = 5;

int b = 3;

int result = a + b;

// result = 8
```

The addition **(+)** operator **adds** two operands.

SUBTRACTION

The subtraction `(-)` operator **subtracts** the second operand from the first.

Example:

```
int a = 10;

int b = 4;

int result = a - b;

// result = 6
```

MULTIPLICATION

The multiplication `(*)` operator **multiplies** two operands.

Example:

```
int a = 7;

int b = 6;

int result = a * b;

// result = 42
```

DIVISION

The division `(/)` operator **divides** the first operand by the second.

Example:

```
int a = 10;

int b = 3;

float result = a / b;

// result = 3.333
```

MODULO

The modulo `(%)` operator returns the **remainder** of the division of the first operand by the second.

Example:

```
int a = 10;

int b = 3;

float result = a % b;

// result = 1
```

INCREMENT

Example:

```
int x = 5;

x++;

// x = 6
```

The increment **(++)** operator **increases** the value of a variable **by 1**.

DECREMENT

The decrement `(--)` operator **decreases** the value of a variable **by 1**.

Example:

```
int x = 5;

x--;

// x = 4
```

EXERCISE

Determine the output of this code snippet:

```
int a = 2;
int b = 4;
int c = 0;
c = (a + b)/a;
cout << c;
```

output:

Determine the output of this code snippet:

```
int a = 2;
int b = 4;
int c = 0;
c = (a + b)%a;
cout << c;
```

output:

EXERCISE

Determine the output of this code snippet:

```
int x = 5;

int y = 3;

int z = 0;

z = (x * y) - (x + y);

cout << z;
```

output:

Determine the output of this code snippet:

```
int p = 10;

int q = 2;

int r = 0;

r = (p % q) + (p / q);

cout << r;
```

output:

EXERCISE

Determine the output of this code snippet:

```
char a = '2';

char b = '3';

char c = '4';

c = a + b;

cout << c;
```

output:

```
101
```

Output Explanation:

When you add two **`char`** variables, they are implicitly converted to their ASCII integer values before the addition.

ASCII of **`'2'`** is **`50`**.

ASCII of **`'3'`** is **`51`**.

EXERCISE

Determine the output of this code snippet:

```
string a = "2";
string b = "3";
string c = "4";
c = a + b;
cout << c;
```

output:

```
23
```

Output Explanation:

The `+` operator performs string concatenation. `a + b` concatenates the string `"2"` and `"3"`, resulting in the string `"23"`.

EXERCISE

Determine the output of this code snippet:

```
int a = 5;

int b = a++;

int c = ++a;

cout << b << " " << c;
```

output:

```
5 7
```

Output Explanation:

++a is pre-increment: increment first then use.

a++ is post-increment: use first then increment.

EXERCISE

Determine the output of this code snippet:

```
int x = 10;
int y = --x;
int z = x--;
cout << y << " " << z;
```

output:

Determine the output of this code snippet:

```
int x = 10;
int y = --x;
int z = ++x;
cout << y << " " << z;
```

output:

EXERCISE

Determine the output of this code snippet:

```
int p = 3;

int q = p++ + ++p;

cout << q;
```

output:

```
8
```

Output Explanation:

`p++` evaluates to **`3`** (current value of **`p`**), then increments **`p`** to **`4`**.

`++p` increments **`p`** to **`5`** and evaluates to **`5`**.

`q = 3 + 5`.

EXERCISE

Determine the output of this code snippet:

```
int m = 6;

int n = 2;

int o = m-- - --n;

cout << o
```

output:

Determine the output of this code snippet:

```
int d = 4;

int e = d++ * --d;

cout << e;
```

output:

LABORATORY

EXERCISE

Complete the code to calculate and display the area of a circle using the given variables. Use the formula:

$$area = \pi r^2$$

assume $\pi = 3.1416$.

```
// variables
    float radius = 0.0;
    float area = 0.0;
// calculate area


// display
```

Expected output:

```
Area of the circle with radius 5 is
78.54
```

```
Area of the circle with radius 12.6 is
498.76
```