

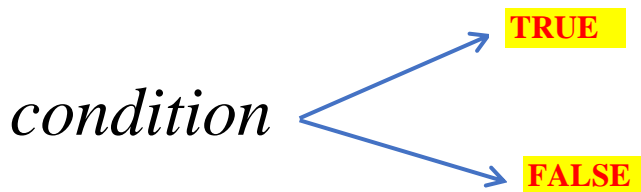
## Simple if - else statement in C++

### Simple if - else Syntax

The form of an if statement is as follows:

```
if(condition) ← No semicolon after if
    statement;
else ← No semicolon after else
    statement;
```

- If the *condition* is true, immediate statement following **if** is executed
- If the *condition* is false, immediate statement following **else** is executed



In C/C++,

1. ZERO → represents FALSE condition
  2. Non-zero → represents TRUE condition
- Examples of non-zero values → 5, -5.1, 100, -206 etc

if (5)

↑

**5** is non-zero and represents **TRUE**

- ❖ **> (greater than)** is relational operator. Note that relational operators return either true or false

Operator	Meaning	Example
==	Equality	5 == 5 // returns True
!=	Not Equal to	5 != 5 // returns False
<	Less Than	5 < 5.5 // returns True
<=	Less Than or Equal	5 <= 5 // returns True
>	Greater Than	5 > 5.5 // returns True
>=	Greater Than or Equal	6.3 >= 5 // returns True
Relational operators		

Note that every operator in C++ must return some value. For example, + operator returns sum of two numbers, \* operator return multiplication of two numbers etc.

## Practice Programs

```
(i)
#include<iostream>
using namespace std;

int main()
{
    int x = 5;

    if(x)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

```
(ii)
#include<iostream>
using namespace std;

int main()
{
    int x = 5;

    if(x>10)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

(iii)

```
#include<iostream>
using namespace std;

int main()
{
    int x = 5;

    if(x == 10)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

(iv)

```
#include<iostream>
using namespace std;

int main()
{
    int x = 5, y = 10;

    if(x+y)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

```

(v)
#include<iostream>
using namespace std;

int main()
{
    int x = 5, y = 10;

    if( (x+y)>30 )
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}

```

```

(vi)
#include<iostream>
using namespace std;

int main()
{
    int x = 5, y = 10;

    if( (x+y)>30 )
    {
        cout<<"Stephen Hawking"<<endl;
        cout<<"Cosmology";
    }

    else
    {
        cout<<"Albert Einstein"<<endl;
        cout<<"Physics";
    }

    return 0;
}

```

```
(vii)
#include<iostream>
using namespace std;

int main()
{
    int x = 5, y = 10;

    if( (x+y)>30 )
        cout<<"Stephen Hawking"<<endl;
        cout<<"Cosmology";

    else
        cout<<"Albert Einstein"<<endl;
        cout<<"Physics";
```

```
(viii) Testing for Leap year
#include<iostream>
using namespace std;

int main()
{
    int year;
    cout<<"enter year";
    cin>>year;

    if((year%400==0)||((year%4==0)&&(year%100!=0)))

    cout<<"given year is leap year";
    else
    cout<<"not leap year";
    return 0;
}
```

## Program explanations

### Program 1

```
#include<iostream>
using namespace std;

int main()
{
    int x = 5;

    if(x)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

int x =5;  
if (x) → if (5)

In C/C++,

1. ZERO → represents FALSE condition
  2. Non-zero → represents TRUE condition
- Examples of non-zero values → 5, -5.1, 100, -206 etc

if(5)



5 is non-zero and represents **TRUE**

So, immediate statement following **if** will be executed

In case condition is false, the statement following **else** will be executed

### Program 2

```
#include<iostream>
using namespace std;

int main()
{
    int x = 5;

    if(x>10)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

int x =5;  
if (x>10) → if (5>10)



5 > 10 evaluates to **FALSE**

So, Albert Einstein is displayed

❖ **> (greater than)** is relational operator. Note that relational operators return either true or false

Operator	Meaning	Example
==	Equality	5 == 5 // returns True
!=	Not Equal to	5 != 5 // returns False
<	Less Than	5 < 5.5 // returns True
<=	Less Than or Equal	5 <= 5 // returns True
>	Greater Than	5 > 5.5 // returns True
>=	Greater Than or Equal	6.3 >= 5 // returns True

Relational operators

Note that every operator in C++ must return some value. For example, + operator returns sum of two numbers, \* operator return multiplication of two numbers etc.

### Program 3

```
#include<iostream>
using namespace std;
```

```
int main()
{
    int x = 5;

    if(x == 10)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

int x=5;  
if(x==10) ———> if(5==10)

Equal To operator

5 == 10 evaluates to FALSE

So, Albert Einstein is displayed

x == y  
↑     ↑  
LHS   RHS

← Compares LHS with RHS. If they are equal, the result is true.  
If they are unequal, the result is false

a == b; tests whether the value of a is equal to b

a = b; simply assigns b to a

### Program 4

```
#include<iostream>
using namespace std;
```

```
int main()
{
    int x = 5, y = 10;

    if(x+y)
        cout<<"Stephen Hawking";
    else
        cout<<"Albert Einstein";

    return 0;
}
```

int x = 5, y = 10;  
if(x + y) ———> if(5 + 10)  
                  ———> if(15)

15 is non-zero and represents TRUE

So, immediate statement following if gets executed





## Program 7

```
#include<iostream>
using namespace std;

int main()
{
    int x = 5, y = 10;

    if( (x+y)>30 )
        cout<<"Stephen Hawking"<<endl;
        cout<<"Cosmology";

    else
        cout<<"Albert Einstein"<<endl;
        cout<<"Physics";

    return 0;
}
```

Not including curly braces **{ }** will create confusion

## Program 8

```
#include<iostream>
using namespace std;
int main()
{
    int year;
    cout<<"enter year";
    cin>>year;

    if((year%400==0)||((year%4==0)&&(year%100!=0)))

    cout<<"given year is leap year";
    else
    cout<<"not leap year";
    return 0;
}
```

$$\text{if} \left( (\text{year} \% 400 == 0) \parallel ((\text{year} \% 4 == 0) \ \&\& \ (\text{year} \% 100 \neq 0)) \right)$$

$$\text{if} \left( (\text{year} \% 400 == 0) \ \text{OR} \ ((\text{year} \% 4 == 0) \ \text{AND} \ (\text{year} \% 100 \neq 0)) \right)$$

**Let year = 2020**

$$\text{if} \left( (2020 \% 400 == 0) \ \text{OR} \ ((2020 \% 4 == 0) \ \text{AND} \ (2020 \% 100 \neq 0)) \right)$$

$$\text{if} \left( (2 == 0) \ \text{OR} \ ((0 == 0) \ \text{AND} \ (5 \neq 0)) \right)$$

$$\text{if} \left( (\text{False}) \ \text{OR} \ ((\text{True}) \ \text{AND} \ (\text{True})) \right)$$

$$\text{if} \left( (\text{False}) \ \text{OR} \ (\text{True}) \right)$$

$$\text{if} \left( \text{True} \right)$$

**so, the answer is: give year is leap year**