**Operator sizeof in C++**

The sizeof operator is aunary compile-time operator used to determine the size of variables, data types, and constants in bytes at compile time. It can also determine the size of classes, structures, and unions.

**Syntax:**

sizeof(datatype)

or

sizeof (expression)

**Example 1: Number of bytes taken by different data types.**

Below is the C++ program to implement sizeof operator to determine the number of bytes taken by different data types:

C++

// C++ program to implement sizeof

// to determine the number of bytes

// taken by different data types

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

cout << "No of Bytes taken up by char is " <<

sizeof(char) << endl;

cout << "No of Bytes taken up by int is " <<

sizeof(int) << endl;

cout << "No of Bytes taken up by float is " <<

sizeof(float) << endl;

cout << "No of Bytes taken up by double is " <<

sizeof(double) << endl;

cout << "No of Bytes taken up by long is " <<

sizeof(long) << endl;

}

**Output**

No of Bytes taken up by char is 1

No of Bytes taken up by int is 4

No of Bytes taken up by float is 4

No of Bytes taken up by double is 8

No of Bytes taken up by long is 8

**Example 2: Number of bytes taken by variables of different data types.**

Below is the C++ program to implement sizeof to determine the number of bytes taken by variables of different data types:

C++

// C++ program to implement sizeof

// to determine the number of bytes

// taken by variables of different

// data types

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

int a;

float b;

char g;

cout << "No of Bytes taken up by a is " <<

sizeof(a) << endl;

cout << "No of Bytes taken up by b is " <<

sizeof(b) << endl;

cout << "No of Bytes taken up by g is " <<

sizeof(g) << endl;

return 0;

}

**Output**

No of Bytes taken up by a is 4

No of Bytes taken up by b is 4

No of Bytes taken up by g is 1

**Example 3: Number of bytes taken by an expression.**

Below is the C++ program to implement sizeof to determine the number of bytes taken by an expression:

C++

// C++ program to implement sizeof

// to determine the number of bytes

// taken by an expression:

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

int a = 5;

long x = 9;

double p = 10.2;

float g = 2.5;

cout << "No of Bytes taken up by (a+g) is " <<

sizeof(a + g) << endl;

cout << "No of Bytes taken up by (a+x) is " <<

sizeof(a + x) << endl;

cout << "No of Bytes taken up by (a+p) is " <<

sizeof(a + p) << endl;

cout << "No of Bytes taken up by (x+p) is " <<

sizeof(x + p) << endl;

return 0;

}

**Output**

No of Bytes taken up by (a+g) is 4

No of Bytes taken up by (a+x) is 8

No of Bytes taken up by (a+p) is 8

No of Bytes taken up by (x+p) is 8

**Example 4: Find the size of an array using sizeof().**

Below is the C++ program to implement sizeof to determine the size of an array:

C++

// C++ program to implement sizeof

// to determine the size of an array

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

int x[] = {1, 2, 3, 5, 6, 7, 8, 9};

int length = sizeof(x) / sizeof(x[0]);

cout << "Length of the array is " <<

length << endl;

return 0;

}

**Output**

Length of the array is 8

**Example 5: Find the size of class.**

Below is the C++ program to implement sizeof to find the size of the class:

C++

// C++ program to implement sizeof

// to find the size of the class

#include <bits/stdc++.h>

using namespace std;

class GFG

{

int x;

};

// Driver code

int main()

{

GFG g;

cout << "Size of class gfg is in bytes : " <<

sizeof(g) << endl;

return 0;

}

**Output**

Size of class gfg is in bytes : 4

**Example 6: Find the size of pointers.**

Below is the C++ program to implement sizeof to find the size of pointers:

C++

// C++ program to implement sizeof

// to find the size of pointers

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

int \*a = new int(10);

char \*g = new char('g');

double \*d = new double(7.5);

cout << "size of pointer a is " <<

sizeof(a) << endl;

cout << "size of pointer \*a is " <<

sizeof(\*a) << endl;

cout << "size of pointer g is " <<

sizeof(g) << endl;

cout << "size of pointer \*g is " <<

sizeof(\*g) << endl;

cout << "size of pointer d is " <<

sizeof(d) << endl;

cout << "size of pointer \*d is " <<

sizeof(\*d) << endl;

return 0;

}

**Output**

size of pointer a is 8

size of pointer \*a is 4

size of pointer g is 8

size of pointer \*g is 1

size of pointer d is 8

size of pointer \*d is 8

**Example 7: Nesting of sizeof() operator.**

Below is the C++ program to show the nesting of sizeof operator:

C++

// C++ program to show the

// nesting of sizeof operator

#include <bits/stdc++.h>

using namespace std;

// Driver code

int main()

{

int x;

double y;

cout << "Nesting of sizeof operator is implemented " <<

"as sizeof(x\*sizeof(y)) :" <<

sizeof(x \* sizeof(y)) << endl;

return 0;

}

**Output**

Nesting of sizeof operator is implemented as sizeof(x\*sizeof(y)) :8

**Example 8: Find the size of the structure.**

Below is the C++ program to implement the sizeof operator to find the size of the structure:

C++

// C++ program to implement the

// sizeof operator to find the

// size of structure

#include <bits/stdc++.h>

using namespace std;

struct gfg

{

int z;

float d;

char s[20];

}g;

// Driver code

int main()

{

cout << "size of structure is " <<

sizeof(g) << endl;

return 0;

}

**Output**

size of structure is 28

**Example 9: Find the size of the union.**

Below is the C++ program to implement the sizeof operator to find the size of the union:

C++

// C++ program to implement the

// sizeof operator to find the

// size of the union

#include <bits/stdc++.h>

using namespace std;

union gfg

{

int z;

double d;

}g;

// Driver code

int main()

{

cout << "size of union is " <<

sizeof(g) << endl;

return 0;

}

**Output**

size of union is 8