Students:
Section 2.18 is a part of 2 assignments: **CSC108 CH02.11-2.24 C2B** ⌄

⊠ This assignment's due date has passed. Activity will still be recorded, but will not count towards this assignment (unless the due date is changed). See this article for more info.

Includes: ▇ CA
Due: 02/06/2025, 11:59 PM EST

2.18 Unsigned

Sometimes a programmer knows that a variable's numbers will always be positive (0 or greater), such as when the variable stores a person's age or weight. The programmer can prepend the word "unsigned" to inform the compiler that the integers will always be positive. Because the integer's sign need not be stored, the integer range reaches slightly higher numbers, as follows:

Table 2.18.1: Unsigned integer data types.

Declaration	Size	Supported number range	Standard-defined minimum size
unsigned char myVar;	8 bits	0 to 255	8 bits
unsigned short myVar;	16 bits	0 to 65,535	16 bits
unsigned long myVar;	32 bits	0 to 4,294,967,295	32 bits
unsigned long long myVar;	64 bits	0 to 18,446,744,073,709,551,615	64 bits
unsigned int myVar;	32 bits	0 to 4,294,967,295	16 bits

Feedback?

Signed numbers use the leftmost bit to store a number's sign, and thus the largest magnitude of a positive or negative integer is half the magnitude for an unsigned integer. Signed numbers actually use a more complicated representation called two's complement, but that's beyond our scope.

The following example demonstrates the use of unsigned long and unsigned long long variables to convert memory size.

Figure 2.18.1: Unsigned variables example: Memory size converter.

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

int main() {
    unsigned long memSizeGiB;
    unsigned long long memSizeBytes;
    unsigned long long memSizeBits;

    cout << "Enter memory size in GiBs: ";
    cin >> memSizeGiB;

    // 1 GiB = 1024 MiB, 1 MiB = 1024 KiB, 1 KiB = 1024 bytes
    memSizeBytes = memSizeGiB * (1024 * 1024 * 1024);
    // 1 byte = 8 bits
    memSizeBits = memSizeBytes * 8;

    cout << "Memory size in bytes: " << memSizeBytes << endl;
    cout << "Memory size in bits: " << memSizeBits << endl;

    return 0;
}
```

```
Enter memory size in GiBs: 1
Memory size in bytes: 1073741824
Memory size in bits: 8589934592

...

Enter memory size in GiBs: 4
Memory size in bytes: 4294967296
Memory size in bits: 34359738368
```

Feedback?

PARTICIPATION ACTIVITY | 2.18.1: Unsigned variables.

1) Declare a 64-bit unsigned integer variable numMolecules.

[   ]

Check   Show answer

2) Declare a 16-bit unsigned integer variable named numAtoms.

[   ]

Check   Show answer

3) Initialize numAtoms to the smallest valid unsigned value.

`unsigned short numAtoms = [     ];`

Check   Show answer

Feedback?

CHALLENGE ACTIVITY | 2.18.1: Unsigned.

620890.5010016.qx3zqy7

Start

A bateria colony has cell count value between 1000 and 1,000,000,000. Declare cellCount as a variable of type `unsigned long`.

```cpp
1  #include "testcode.h"  // For code testing purpose
2  #include <iostream>
3  using namespace std;
4
5  int main() {
6
7      /* Your code goes here */
8
9      // Assign cellCount with various values. Each unsigned value ends with u
10     cout << "Cell counts: " << endl;
11
12     cellCount = 6700000u;
13     cout << cellCount << endl;
14
15     cellCount = 1300000u;
16     cout << cellCount << endl;
17
```

Check

Feedback?

How was this section? 👍 | 👎   Provide section feedback

Activity summary for assignment: **CSC108 CH02.11-2.24 C2B** ⌄

51 / 51 points

Due: 02/06/2025, 11:59 PM EST

This assignment's due date has passed. Activity will still be recorded, but will not count towards this assignment (unless the due date is changed). See this article for more info.

51 / 51 points submitted to BlackboardLearn

Completion details ⌄