On the other hand, treating characters as numbers can lead to various programming errors that won't be caught by the compiler, and lets us write meaningless expressions such as `'a' * 'b' / 'c'`. It can also hamper portability, since our programs may be based on assumptions about the underlying character set. (Our `for` loop, for example, assumes that the letters from A to Z have consecutive codes.)

Signed and Unsigned Characters

Since C allows characters to be used as integers, it shouldn't be surprising that the `char` type—like the integer types—exists in both signed and unsigned versions. Signed characters normally have values between –128 and 127, while unsigned characters have values between 0 and 255.

The C standard doesn't specify whether ordinary `char` is a signed or an unsigned type; some compilers treat it as a signed type, while others treat it as an unsigned type. (Some even allow the programmer to select, via a compiler option, whether `char` should be signed or unsigned.)

Most of the time, we don't really care whether `char` is signed or unsigned. Once in a while, though, we do, especially if we're using a character variable to store a small integer. For this reason, C allows the use of the words `signed` and `unsigned` to modify `char`:

Q&A

```
signed char sch;
unsigned char uch;
```

portability tip

Don't assume that `char` *is either signed or unsigned by default. If it matters, use* `signed char` *or* `unsigned char` *instead of* `char`.

In light of the close relationship between characters and integers, C89 uses the term ***integral types*** to refer to both the integer types and the character types. Enumerated types are also integral types.

enumerated types ➤ 16.5

C99

C99 doesn't use the term "integral types." Instead, it expands the meaning of "integer types" to include the character types and the enumerated types. C99's `_Bool` type is considered to be an unsigned integer type.

_Bool type ➤ 5.2

Arithmetic Types

The integer types and floating types are collectively known as ***arithmetic types***. Here's a summary of the arithmetic types in C89, divided into categories and subcategories:

- Integral types
  - `char`
  - Signed integer types (`signed char`, `short int`, `int`, `long int`)
  - Unsigned integer types (`unsigned char`, `unsigned short int`, `unsigned int`, `unsigned long int`)