

# CSCI 1301 - Datatypes in C#

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## Value Types

### Numeric

#### Signed Integer

Type	Range	Size
sbyte	-128 to 127	Signed 8-bit integer
short	-32,768 to 32,767	Signed 16-bit integer
int	-2,147,483,648 to 2,147,483,647	Signed 32-bit integer
long	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807	Signed 64-bit integer

#### Unsigned Integer

Type	Range	Size
byte	0 to 255	Unsigned 8-bit integer
ushort	0 to 65,535	Unsigned 16-bit integer
uint	0 to 4,294,967,295	Unsigned 32-bit integer
ulong	0 to 18,446,744,073,709,551,615	Unsigned 64-bit integer

#### Real Number

Type	Approximate Range	Precision
float	$\pm 1.5e-45$ to $\pm 3.4e38$	7 digits
double	$\pm 5.0e-324$ to $\pm 1.7e308$	15–16 digits
decimal	$(-7.9 \times 10^{28}$ to $7.9 \times 10^{28}) / (100$ to $10^{28})$	28–29 significant digits

## Logical

Type	Possible Values	Size
<code>bool</code>	<code>true</code> , <code>false</code>	8-bit

## Character

Type	Range	Size
<code>char</code>	U+0000 to U+ffff	Unicode 16-bit character

## Literals

Name	Corresponding datatype	Examples
Integer Literal	<code>int</code>	40, -39, 291838, 0, ...
Float Litteral	<code>float</code>	3.5F, -43.5f, 309430.70006F, ...
Double Literal	<code>double</code>	28.98, 239.0, -391.089, 0.0, ...
Decimal Literal	<code>decimal</code>	8.95m, 3283.9M, -30m, ...
Boolean Literal	<code>bool</code>	<code>true</code> , <code>false</code>
Character Literal	<code>char</code>	'Y', 'a', '0', '\n', '\x0058', '\u0058', ...

## Compatibility

	Integer Litteral	Float Litteral	Double Litteral	Decimal Litteral
<b><code>int</code></b>	✓	✗	✗	✗
<b><code>float</code></b>	✓	✓	✗	✗
<b><code>double</code></b>	✓	✓	✓	✗
<b><code>decimal</code></b>	✓	✓	✓	✓

## Result Type of Operations

	<code>int</code>	<code>float</code>	<code>double</code>	<code>decimal</code>
<b><code>int</code></b>	<code>int</code>	<code>float</code>	<code>double</code>	<code>decimal</code>
<b><code>float</code></b>	<code>float</code>	<code>float</code>	<code>double</code>	illegal
<b><code>double</code></b>	<code>double</code>	<code>double</code>	<code>double</code>	illegal
<b><code>decimal</code></b>	<code>decimal</code>	illegal	illegal	<code>decimal</code>

## References

- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/integral-types-table>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/floating-point-types-table>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/decimal>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/value-types-table>
- <https://docs.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/types-and-variables>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/sizeof>
- <http://zetcode.com/lang/csharp/datatypes/>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/implicit-numeric-conversions-table>
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