

## float Data Type

It is a 32-bit, single-precision **IEEE 754** (Standard for Floating-Point Arithmetic) floating-point number. It means that it gives 6-7 decimal digits precision. It is used if we want to use memory effectively because it takes less memory in comparison to double data type. To define a float value, we must use a suffix `f` or `F`. Its default value is `0.0f`. By default, float numbers are treated as double in Java.

- It occupies **4** bytes.
- It follows **single-precision** (6-7 decimal digits).
- There will be **no data loss** if we convert float to double.
- It uses **F** or **f** as a suffix. It is mandatory to add a suffix if you are declaring a float variable.

**Range:**

float minValue = 1.4e-45f; 1.4 multiplied by 10 raised to the power of -45

[illegible]

```
float maxValue = 3.4e38f;
```

The value of `3.4e38f` is a very large positive number in scientific notation. It represents 3.4 multiplied by 10 raised to the power of 38. In decimal form, it is approximately equal to `340000000000000000000000000000000000.`

For example, if we define a float number as:

1. **float** height = 167.7

The above declaration of float variable gives the compilation error. We can correct the error by adding a suffix f or F.

1. **float** height = 167.7f
2. or
3. **float** height = 167.7F

Floating- Point Data Type	Values	Size (bits)*	Storage Requirement (bytes)	Default Value	Precision	Decimal Digits
float	IEEE 754 Floating- Point	32	4	0.0f	Single	6 decimal digits
double	IEEE 754 Floating- Point	64	8	0.0d	Double	15 decimal digits

## double Data Type

The double data type is a 64-bit double-precision IEEE 754 floating-point number. It means that it gives 15-16 decimal digits precision. It consumes more memory in comparison to the float data type. It is used to store decimal values. Its default value is 0.0d. It is optional to add suffix d or D. For example:

1. **double** price = 987.90D  
(or)
2. **double** price = 987.90d  
(or)
3. **double** price = 987.90

- It follows **double-precision** (15-16 decimal digits).
- The **double** keyword is used to define a double-precision number.
- There will be **data loss** if we convert double to float.
- It uses **d** or **D** as a suffix. It is optional to add a suffix if you are declaring a double variable.

### Range:

```
double minValue = 4.9e-324;
double maxValue = 1.8e308;
```

The `double` data type uses 1 bit for the sign, 11 bits for the exponent, and 52 bits for the significand (mantissa). Similar to the `float` data type, the actual range and precision of `double` numbers can vary slightly due to the limitations of binary representation.