

1. **byte:** 8-bit signed integer

- Range: -2^7 to $2^7 - 1$ (-128 to 127)
- $2^7 = 128$
- To convert 128 to a power of 10: $\log_{10}(128) \approx 2.107$, so roughly 10^2

2. **short:** 16-bit signed integer

- Range: -2^{15} to $2^{15} - 1$ (-32,768 to 32,767)
- $2^{15} = 32,768$
- To convert 32,768 to a power of 10: $\log_{10}(32768) \approx 4.515$, so roughly 10^4

3. **int:** 32-bit signed integer

- Range: -2^{31} to $2^{31} - 1$ (-2,147,483,648 to 2,147,483,647)
- $2^{31} = 2,147,483,648$
- To convert 2,147,483,648 to a power of 10: $\log_{10}(2147483648) \approx 9.332$, so roughly 10^9

4. **long:** 64-bit signed integer

- Range: -2^{63} to $2^{63} - 1$ (-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807)
- 2^{63} is beyond 10^{19} , so it's larger than c ↓ e represented as a simple power of 10.

1. **float:** 32-bit floating point

- Range: Approximately $\pm 3.40282347 \times 10^{38}$
- This range is approximately 10^{38}

2. **double:** 64-bit floating point

- Range: Approximately $\pm 1.79769313486231570 \times 10^{308}$
- This range is approximately 10^{308}