

Data units conversion

2^0	2^1	2^2	2^3	2^4	2^5	2^6	2^7	2^8	2^9	2^{10}	2^{11}	2^{12}	2^{13}
1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192

Name	Symbol	Value
bit	b	1b = 0, 1b = 1
byte	B	1B = 8b
kilobyte	KB	1KB = 1024B = 2^{10} B = $1024 \cdot 8b = 8192b = 2^{13}b$
megabyte	MB	1MB = 1024KB = 2^{10} KB = 2^{20} B = $2^{20} \cdot 2^3 = 2^{23}b$
gigabyte	GB	1GB = 1024MB = 2^{10} MB = $2^{10} \cdot 2^{10} \cdot 2^{10} = 2^{30}$ B = $2^{33}b$
terabyte	TB	1TB = 1024GB = $2^{43}b$
petabyte	PB	1PB = 1024TB
...

$$1\text{MB} = 8\text{Mb}$$

$$1\text{GB} = 8\text{Gb}$$

$$32768\text{B} = 2^{15}\text{B} = 2^{15} \cdot 2^3 = 2^{18}b$$

$$2^{18}b \div 2^{10} = 2^8\text{Kb (kilobits)}$$

$$2^8\text{Kb} \div 2^{10} = 2^{-2}\text{Mb (megabits)}$$

$$2^{-2}\text{Mb} \div 2^{10} = 2^{-12}\text{Gb (gigabits)}$$

$$0,25\text{TB} = 2\text{Tb} = 2^1 \cdot 2^{10} = 2^{11}\text{Gb}$$

$$2048\text{GB} = 2^{11}\text{GB} = 2^{11} \cdot 2^{10} \cdot 2^{10} = 2^{31}\text{KB}$$

Exercise 1. How long will it take to download a 1GB file with a 300Mb/s constant link?

$$1\text{GB} = 1024\text{MB} = 8192\text{Mb}$$

$$8192/300 = 27,3\text{s}$$

Exercise 2. Can we save 250 800KB files on a 32GB pendrive?

$$32\text{GB} = 2^5 \cdot 2^{10} = 2^{15}\text{MB} \cdot 2^{10} = 2^{25}\text{KB} = 33554432\text{KB}$$

$$33554432/800 \approx 41943$$

Answer: Yes, we can.