

# How Much Text is in a Kilobyte or Megabyte?

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A bit is the most basic unit of information. At their most fundamental level, most modern computers operate on binary bits which means that they can have two states, usually specified as a 0 or 1. Long strings of these bits can be used to represent most types of information including text, pictures and music.

Most modern computers are binary systems and therefore, they are particularly well suited to working with bits. Pure binary information, however, is of little use to humans. The binary number 11000101110 is equivalent to 1582; it is obvious that we are much more suited to working with digits and text instead of ones and zeros.

To help make computers more like our language-based way of thinking, groups of bits are joined into bytes. One byte is comprised of 8 bits. A set of 8 bits was chosen because this provides 256 total possibilities which is sufficient for specifying letters, numbers, spaces, punctuation and other extended characters. This very sentence, for example is composed of 125 bytes because there are 125 letters, digits, spaces and punctuation marks. Keep in mind that we are discussing pure text; some word processing programs, include other sorts of formatting data, and therefore the filesizes will be greater than the number of characters in the file.

It is estimated that a kilobyte can accommodate about 1/2 of a typewritten page. Therefore, one full page requires about 2 kilobytes. The chart below illustrates the number of bytes in common terms such as kilobyte and megabyte and how much text could be stored:

| Name                 | Number of Bytes                               | Amount of Text                     |
|----------------------|---|------------------------------------|
| <b>Kilobyte (KB)</b> | $2^{10}$ or 1,024                             | 1/2 page                           |
| <b>Megabyte (MB)</b> | $2^{20}$ or 1,048,576                         | 500 pages or 1 thick book          |
| <b>Gigabyte (GB)</b> | $2^{30}$ or 1,073,741,824                     | 500,000 pages or 1,000 thick books |
| <b>Terabyte (TB)</b> | $2^{40}$ or 1,099,511,627,776                 | 1,000,000 thick books              |
| <b>Petabyte</b>      | $2^{50}$ or 1,125,899,906,842,624             | 180 Libraries of Congress          |
| <b>Exabyte</b>       | $2^{60}$ or 1,152,921,504,606,846,976         | 180 thousand Libraries of Congress |
| <b>Zettabyte</b>     | $2^{70}$ or 1,180,591,620,717,411,303,424     | 180 million Libraries of Congress  |
| <b>Yottabyte</b>     | $2^{80}$ or 1,208,925,819,614,629,174,706,176 | 180 billion Libraries of Congress  |

The Library of Congress in Washington D.C. is said to be the world's largest library with over 28 million volumes. The numbers listed in the chart above are based on the assumption that the average book has 200 pages. Most Compact Discs (CD) can hold approximately 750 megabytes (mB) which is roughly equivalent to 375,000 pages of text! DVDs can store 4.7 gigabytes (gB) or 2.3 million pages. The next generation of optical media, Blu-Ray discs, can hold an astonishing 27 gigabytes or 13.5 million pages which is roughly equivalent to the text contained in 67,500 books!

| <b>Data Measurement Chart</b> |                                     |                             |
|-------------------------------|-------------------------------------|-----------------------------|
| <b>Data Measurement</b>       | <b>Size</b>                         |                             |
| <b>Bit</b>                    | <b>Single Binary Digit (1 or 0)</b> |                             |
| <b>Byte</b>                   | <b>8 bits</b>                       |                             |
| <b>Kilobyte (KB)</b>          |                                     |                             |
|                               | <b>Bytes</b>                        | 1024 Bytes                  |
|                               | <b>Bits</b>                         | 8192 Bits                   |
| <b>Megabyte (MB)</b>          |                                     |                             |
|                               | <b>Kilobytes</b>                    | 1,024 KB                    |
|                               | <b>Bytes</b>                        | 1048576 Bytes               |
|                               | <b>Bits</b>                         | 8388608 Bits                |
| <b>Gigabyte (GB)</b>          |                                     |                             |
|                               | <b>Megabytes</b>                    | 1,024 MB                    |
|                               | <b>Kilobytes</b>                    | 1048576 KB                  |
|                               | <b>Bytes</b>                        | 1073741824 Bytes            |
|                               | <b>Bits</b>                         | 8589934592 Bits             |
| <b>Terabyte (TB)</b>          |                                     |                             |
|                               | <b>Gigabytes</b>                    | 1,024 GB                    |
|                               | <b>Megabytes</b>                    | 1048576 MB                  |
|                               | <b>Kilobytes</b>                    | 1073741824 KB               |
|                               | <b>Bytes</b>                        | 1099511627776 Bytes         |
|                               | <b>Bits</b>                         | 8796093022208 Bits          |
| <b>Petabyte (PB)</b>          |                                     |                             |
|                               | <b>Terabytes</b>                    | 1,024 TB                    |
|                               | <b>Gigabytes</b>                    | 1048576 GB                  |
|                               | <b>Megabytes</b>                    | 1073741824 MB               |
|                               | <b>Kilobytes</b>                    | 1099511627776 KB            |
|                               | <b>Bytes</b>                        | 1125899906842624 Bytes      |
|                               | <b>Bits</b>                         | 9007199254740992 Bits       |
| <b>Exabyte (EB)</b>           |                                     |                             |
|                               | <b>Petabytes</b>                    | 1,024 PB                    |
|                               | <b>Terabytes</b>                    | 1048576 TB                  |
|                               | <b>Gigabytes</b>                    | 1073741824 GB               |
|                               | <b>Megabytes</b>                    | 1099511627776 MB            |
|                               | <b>Kilobytes</b>                    | 1125899906842624 KB         |
|                               | <b>Bytes</b>                        | 11522921504606846976 Bytes  |
|                               | <b>Bits</b>                         | 1180591620717411303424 Bits |