

How Much Data Is That?

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[James S. Huggins' Refrigerator Door](#)

Whenever we discuss quantities of data, we tend to do it in the abstract. We speak of a kilobyte, or a megabyte or a gigabyte without really knowing what it represents.

The following table shows various quantities of bytes, in each power of ten. Usually, they are shown with multiples of 2 and 5 also. For example, 1 Kilobyte, 2 Kilobytes, 5 Kilobytes.

All the examples are approximate and are rounded. For example, a computer card has 80 columns. If 50 columns contain data on a card, then two cards will be 100 bytes. Also, a 3-1/2 inch diskette can contain 1.4 Megabytes. Showing it as 1 Megabyte reflects both (a) the diskette not typically being filled and (b) rounding. Finally, a CD-ROM can hold more than 500 Megabytes. However, it is listed at that level as "typical" and as the closest match.

Bytes (8 bits)

0.1 bytes: A single yes/no decision (actually 0.125 bytes, but I rounded)

1 byte: One character

2 bytes:

5 bytes

10 bytes: One word (a word of language, not a computer word)

20 bytes:

50 bytes:

100 bytes: Telegram; two punched computer (Hollerith) cards

200 bytes:

500 bytes:

Kilobyte

1,024 bytes; 2¹⁰;

approx. 1,000 or 10³

1 Kilobyte: Joke; (very) short story

2 Kilobytes: Typewritten page

10 Kilobytes: Page out of an encyclopedia

20 Kilobytes:

50 Kilobytes: Image of a document page, compressed

100 Kilobytes: Photograph, low-resolution

200 Kilobytes: Two boxes (4000) punched computer (Hollerith) cards

500 Kilobytes: Five boxes, one case (10,000) of punched computer (Hollerith) cards

Megabyte

1,048,576 bytes; 2²⁰;
approx 1,000,000 or 10⁶

1 Megabyte: Small novel; 3-1/2 inch diskette

2 Megabytes: Photograph, high resolution

5 Megabytes: Complete works of Shakespeare; 30 seconds of broadcast-quality video

10 Megabytes: Minute of high-fidelity sound; digital chest X-ray; Box of 3-1/2 inch diskettes

20 Megabytes: Two boxes of 3-1/2 inch diskettes

50 Megabytes: Digital mammogram

100 Megabytes: Yard of books on a shelf; two encyclopedia volumes

200 Megabytes: Reel of 9-track tape; IBM 3480 cartridge tape

500 Megabytes: CD-ROM

Gigabyte

1,073,741,824 bytes; 2³⁰;
approx 1,000,000,000 or 10⁹

1 Gigabyte: Paper in the bed of a pickup; symphony in high-fidelity sound; broadcast quality movie

2 Gigabytes: 20 yards of books on a shelf

5 Gigabytes: 8mm Exabyte tale

10 Gigabytes:

20 Gigabytes: Audio collection of the works of Beethoven; five Exabyte tapes; VHS tape used to store digital data

50 Gigabytes: Library floor of books on shelves

100 Gigabytes: Library floor of academic journals on shelves; large ID-1 digital tape

200 Gigabytes: 50 Exabyte tapes

Terabyte

1,099,511,627,776 or 2⁴⁰;
approx. 1,000,000,000,000 or 10¹²

1 Terabyte: Automated tape robot; all the X-ray films in a large technological hospital; 50,000 trees made into paper and printed; daily rate of EOS (Earth Orbiting System) data (1998)

2 Terabytes: Academic research library

10 Terabytes: Printed collection of the U. S. Library of Congress

50 Terabytes: Contents of a large mass storage system

Petabyte

1,125,899,906,842,624 bytes or 2⁵⁰
approx. 1,000,000,000,000,000 or 10¹⁵

1 Petabyte: 3 years of EOS data (2001)

2 Petabytes: All U. S. academic research libraries

20 Petabytes: 1995 production of hard-disk drives

200 Petabytes: All printed material; 1995 production of digital magnetic tape

Exabyte

1,152,921,504,606,846,976 bytes or 260

approx. 1,000,000,000,000,000,000 or 10^{18}

5 Exabytes: All words ever spoken by human beings.

Zettabyte

1,180,591,620,717,411,303,424 bytes or 270

approx. 1,000,000,000,000,000,000,000 or 10^{21}

Yottabyte

1,208,925,819,614,629,174,706,176 bytes or 280

approx. 1,000,000,000,000,000,000,000,000 or 10^{24}

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