

Name _____ period _____

Byte & bits calculation practice

The smallest amount of transfer is the bit. It holds the value of a 1, or a 0. (Binary coding). Eight of these 1's and zero's are called a byte.

Why eight? The earliest computers could only send 8 bits at a time, it was only natural to start writing code in sets of 8 bits. This came to be called a byte.

A bit is represented with a lowercase "b," whereas a byte is represented with an uppercase "B" (B). So Kb is kilobits, and KB is kilobytes. A kilobyte is eight times larger than a kilobit.

A simple 1 or 0, times eight of these 1's and 0's put together is a byte. The string of code: 10010101 is exactly one byte. So a small gif image, about 4 KB has about 4000 lines of 8 1's and 0's. Since there are 8 per line, that's over (4000 x 8) 32,000 1's and 0's just for a single gif image.

How many bytes are in a kilobyte (KB)? One may think it's 1000 bytes, but its really 1024. Why is this so? It turns out that our early computer engineers, who dealt with the tiniest amounts of storage, noticed that 2^{10} (1024) was very close to 10^3 (1000); so based on the prefix kilo, for 1000, they created the KB. (You may have heard of kilometers (Km) which is 1000 meters). So in actuality, one KB is really 1024 bytes, not 1000. It's a small difference, but it adds up over a while.

The MB, or megabyte, mega meaning one million. Seems logical that one mega (million) byte would be 1,000,000 (one million) bytes. It's not however. One megabyte is 1024 x 1024 bytes. 1024 kilobytes is called one Megabyte. So one kilobyte is actually 1024 bytes, and 1024 of those is (1024 x 1024) 1048576 bytes. In short, one Megabyte is really 1,048,576 bytes.

Use the following conversion table to do the problems

Name	Abbr.	Size = bytes
Kilo	K	$2^{10} = 1,024$
Mega	M	$2^{20} = 1,048,576$
Giga	G	$2^{30} = 1,073,741,824$
Tera	T	$2^{40} = 1,099,511,627,776$

<http://computer.howstuffworks.com/bytes.htm/printable>

1. The songs in your music library have an average file size of 2.3Mb. If you have 512 songs how many Gb of storage do you need?



2. You have a 2Gb Ipod Nano. How many songs can you fit on it if your average song file is 4.2Mb?

3. You have a music library that takes up 3,300,000,470 bytes. Do you need to buy a 2Gb Ipod or a 4 Gb Ipod to fit the library?