

# Lesson 5 : Large quantities

Computing

**Representations: from clay to silicon**

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*Materials from the Teach Computing Curriculum created by the National Centre for Computing Education*



# Bits, bytes, and prefixes

## Unit conversions

What does it mean?

bit	b	binary digit (0 or 1)
byte	B	8 binary digits

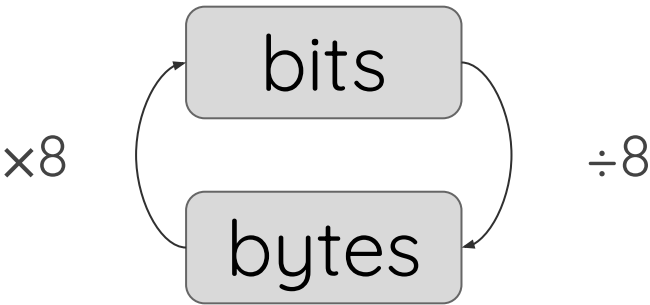
What does it mean?

kilo-	K	thousands
mega-	M	millions
giga-	G	billions
tera-	T	trillions

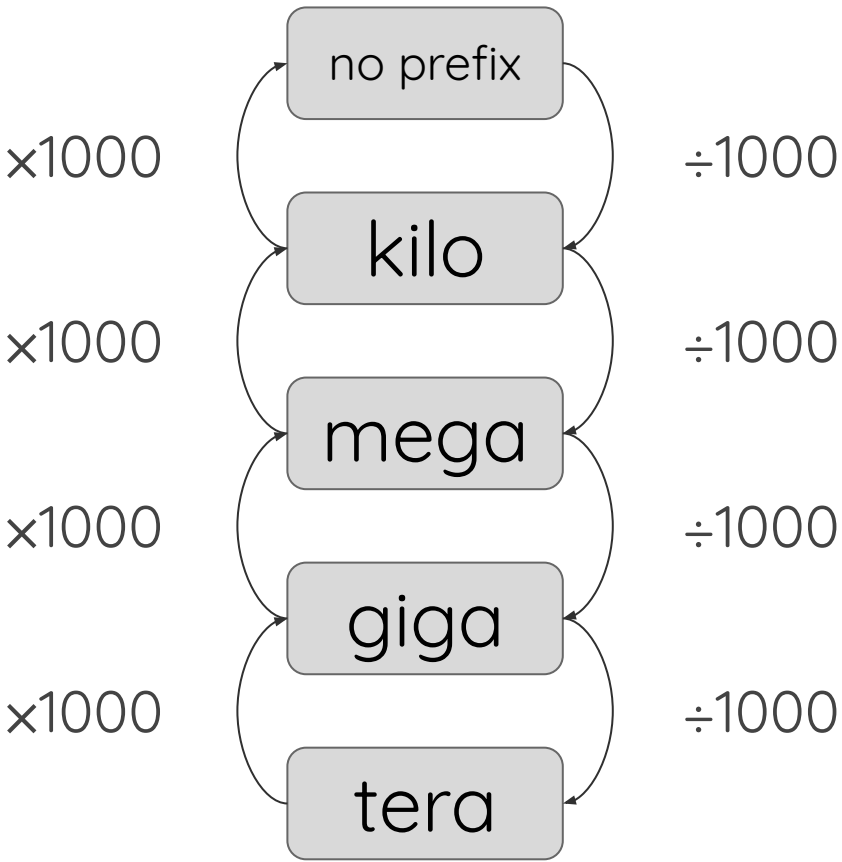
Use these tables to **translate**:

200 bytes = 200 groups of 8 binary digits  
1Mb = 1 Megabit = 1 million binary digits  
10KB = 10 Kilobytes = 10 thousand groups of 8 bits

How do I convert?



How do I convert?



Use these graphs to **convert** between units:

5GB = 5 × 1000MB = 5000MB  
700MB = 700 ÷ 1000GB = 0.7GB  
24Kb = 24 ÷ 8 KB = 3KB

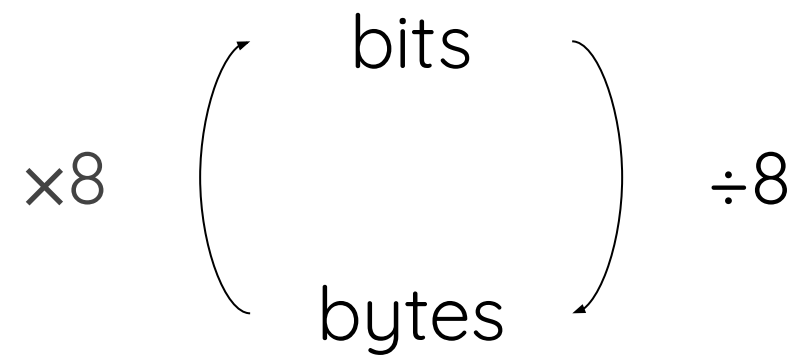


# Task 1 - Bits and bytes

You come across a small text file in your hard disk. The name of the file is 'simple' and its size is 12 bytes.

**Question:** How many binary digits (bits) does this file contain?

Name	Size	Type
simple	12 bytes	Text



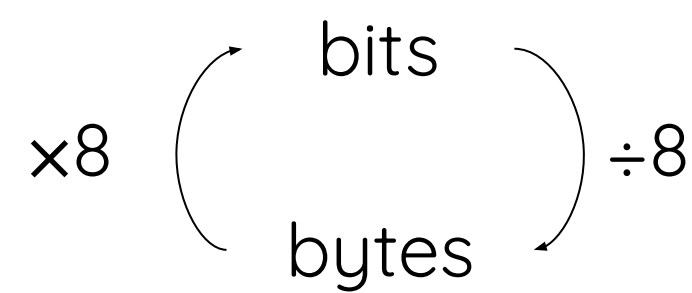
## Your answer

Number of bits in the file:



# Task 2: Bits and bytes: Symbols

Complete the last column of the table: how many bytes are required for each of the characters?



Character	Binary Representation	Number of bits	Number of bytes?
@	01000000	8	
£	11000010 10100011	16	
**	11100010 10000001 10000010	24	
♫	11110000 10011101 10000100 10011110	32	



# Task 3 - Compare

In the table below, you can see the name, size, and type of six files.

In the blank column to the right, write the **sizes** of the files **in order** from the smallest to the largest one.

Name ▼	Type	Size	Size (order: smaller to larger)
book.pdf	document	23.0MB	
book.txt	text	720KB	
logo.png	image	23KB	
party.mkv	video	2.0GB	
picture.jpg	image	2.3MB	
song.mp3	audio	1.6MB	



## Task 4 - Converting to bits (Solution)

Nowadays, a standard hard disk has a capacity of 1TB.

'T' stands for the prefix 'tera-' and uppercase 'B' means 'bytes', so 1TB is 1 terabyte.

### Questions

### Your answers ▾

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How many **bytes** is 1 terabyte?

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How many **bits** is 1 terabyte?

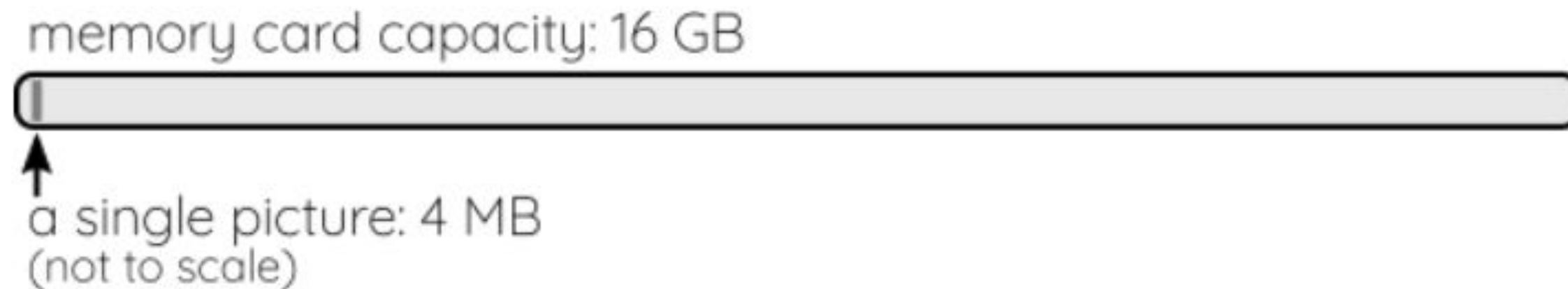
Hint: Start from your answer to the previous question.

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## Task 5 - How many will fit? (Solution)

You really enjoy taking pictures with your mobile phone. You purchase a 16GB memory card and you want to know how many pictures you can store on the memory card. The size of each individual picture is approximately 4MB.



### Questions

### Your answers ▾

The card's capacity is expressed in GB (gigabytes). A picture's size is expressed in MB (megabytes). You will need to **convert**.

How many MB is 16GB?  
(Convert 16 gigabytes to megabytes.)

