Calculate the file transfer time

# Formula .

The formula to calculate the time it will take to transmit a file is:

time = size of file (in bits) ÷ network speed (in bits)

# Measurements of storage .

Byte – B –> 8 bits

Kilobyte – kB –> 1,000 bytes

Megabyte – MB –> 1,000 kilobytes

Megabit – Mb –> 1,000,000 bits (a million bits)

Note that a megabyte and a megabit are **different** measurements of storage. A capital B is used to signify a byte and a lowercase b is used to represent a bit.

# Worked example 2MB at 1Mbps

**Example question –** How many seconds will it take to transmit 2 megabytes (MB) of data using a network transmission speed of 1 megabit per second (Mbps)?

| **Step one** – Convert 2MB to bits  2 MB × 1,000 = 2,000 kilobytes  2,000 Kb × 1,000 = 2,000,000 bytes  2,000,000 bytes × 8 = 16,000,000 bits  Note: You multiple by 8 to get the number of bits. There are 8 bits in a byte.  **Step two** – Convert 1Mb into bits  1 × 1,000,000 = 1,000,000 bits  **Step three** – Use the formula  16,000,000 ÷ 1,000,000 = 16 seconds ✔ |
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# Task 1 All the bits

**Question one –** How many seconds will it take to transmit 50 bits of data using a network transmission speed of 10 bits per second?

| 50 ÷ 10 = 5 seconds |
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**Question two –** How many seconds will it take to transmit 1000 bits of data using a network transmission speed of 100 bits per second?

| 1000 ÷ 100 = 10 seconds |
| --- |

**Question three –** How many seconds will it take to transmit 20,000 bits of data using a network transmission speed of 1,000 bits per second?

| 20,000 ÷ 1,000 = 20 seconds |
| --- |

# Task 2 Converting from kilobytes

**Question one –** How many seconds will it take to transmit 2kB of data using a network transmission speed of 1Mb per second?

| 2 kB × 1,000 = 2,000 bytes  2,000 bytes x 8 = 16,000 bits  1 Mb = 1,000,000 bits  16,000 ÷ 1,000,000 = 0.016 seconds ✔ |
| --- |

**Question two –** How many seconds will it take to transmit 10kB of data using a network transmission speed of 2Mb per second?

| 10 kB × 1,000 = 10,000 bytes  10,000 bytes × 8 = 80,000 bits  2 Mb = 2,000,000 bits  80,000 ÷ 2,000,000 = 0.04 seconds ✔ |
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# Task 3 Converting from megabytes

**Question one –** How many seconds will it take to transmit 10MB of data using a network transmission speed of 1Mb per second?

| 10 MB × 1,000 = 10,000 kB  10,000 kB × 1,000 = 10,000,000 bytes  10,000,000 bytes × 8 = 80,000,000 bits  1 Mb = 1,000,000 bits  80,000,000 ÷ 1,000,000 = 80 seconds ✔ |
| --- |

**Question two –** How many seconds will it take to transmit 50MB of data using a network transmission speed of 2Mb per second?

| 50 MB × 1,000 = 50,000 kB  50,000 kB × 1,000 = 50,000,000 bytes  50,000,000 bytes × 8 = 400,000,000 bits  2 Mb = 2,000,000 bits  400,000,000 ÷ 2,000,000 = 200 seconds ✔ |
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# Explorer task Converting from gigabytes

**Question –** A gigabyte is equivalent to 1,000 megabytes. How many seconds will it take to transmit 2GB of data using a network transmission speed of 1,000Mb per second?

| 2 GB × 1,000 = 2,000 MB  2,000 MB × 1,000 = 2,000,000 kB  2,000,000 kB × 1,000 = 2,000,000,000 bytes  2,000,000,000 bytes x 8 = 16,000,000,000 bits  1,000 Mb = 1,000,000,000 bits  16,000,000,000 ÷ 1,000,000,000 = 16 seconds ✔ |
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