MODULE B MEMORY AND STORAGE · B8

# Calculating file sizes: mark scheme

20 marks · Cambridge 0478 syllabus 1.3.2 (with 1.2.2, 1.2.3)

**How to use.** One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. Calculations: one mark for each correct stage of working (max 2) and one mark for the correct answer; the unit is not needed when the question sets it. The syllabus requires 1024, not 1000: an answer using 1000 at any unit step scores 0 for the answer mark.

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **1(a)** 0478 1.2.3 | The number of pixels in the image // width × height in pixels | **1** | Do not accept "the quality of the image" alone. |
| **1(b)** 0478 1.2.3 | The number of bits used to represent each colour // bits per pixel | **1** | Do not accept "the number of colours" alone. |
| **1(c)** 0478 1.2.2 | The number of bits per sample | **1** | Do not accept "the number of samples (per second)" (that is sample rate). |
| **2(a)** 0478 1.3.2 | Any two working marks from:<br>512 × 256 × 8 // = 1 048 576 bits<br>÷ 8 // = 131 072 bytes<br>÷ 1024<br>Answer:<br>128 (KiB) | **3** | Full working: 512 × 256 = 131 072 pixels; × 8 = 1 048 576 bits; ÷ 8 = 131 072 bytes; ÷ 1024 = 128 KiB.<br>max 2 for working.<br>131.072 (÷ 1000) scores 0 for the answer. |
| **3(a)** 0478 1.3.2 | Any two working marks from:<br>1024 × 1024 × 24 // = 25 165 824 bits<br>÷ 8 // = 3 145 728 bytes<br>÷ 1024 // = 3072 KiB<br>÷ 1024 (again)<br>Answer:<br>3 (MiB) | **3** | Full working: 1024 × 1024 = 1 048 576 pixels; × 24 = 25 165 824 bits; ÷ 8 = 3 145 728 bytes; ÷ 1024 = 3072 KiB; ÷ 1024 = 3 MiB.<br>Shortcut accepted: 1024 × 1024 pixels × 3 bytes ÷ (1024 × 1024) = 3 MiB.<br>max 2 for working.<br>3072 (left in KiB) does not score the answer mark. |
| **4(a)** 0478 1.3.2 | Any two working marks from:<br>8192 × 8 × 128 // = 8 388 608 bits<br>÷ 8 // = 1 048 576 bytes<br>÷ 1024 // = 1024 KiB<br>÷ 1024 (again)<br>Answer:<br>1 (MiB) | **3** | Full working: 8192 × 128 = 1 048 576 samples; × 8 = 8 388 608 bits; ÷ 8 = 1 048 576 bytes; ÷ 1024 = 1024 KiB; ÷ 1024 = 1 MiB.<br>max 2 for working. |

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **4(b)**<br>0478 1.3.2 | 2 (MiB) | **1** | 8192 × 16 × 128 = 16 777 216 bits = 2 097 152 bytes = 2 MiB. FT: double their answer to 4(a). |
| **5(a)**<br>0478 1.3.2 | Any two working marks from:<br>4096 × 16 × 30 // = 1 966 080 bits<br>÷ 8 // = 245 760 bytes<br>÷ 1024<br>Answer:<br>240 (KiB) | **3** | Full working: 4096 × 30 = 122 880 samples; × 16 = 1 966 080 bits; ÷ 8 = 245 760 bytes; ÷ 1024 = 240 KiB.<br>Hand tip: each second is 4096 × 16 ÷ 8 = 8192 bytes = 8 KiB, and 8 KiB × 30 = 240 KiB. Accept this method.<br>max 2 for working.<br>245.76 (÷ 1000) scores 0 for the answer. |
| **6(a)**<br>0478 1.3.2 | Divided by 1000 instead of 1024 // should divide by 1024 (1 KiB = 1024 bytes)<br>4 (KiB) | **2** | 4096 ÷ 1024 = 4. Do not accept "the first line is wrong" (the first two lines are correct). |
| **7(a)**<br>0478 1.2.2 | The file size decreases // fewer samples (per second) are stored<br>The accuracy of the recording decreases // the recording is less like the original sound | **2** | One mark per effect. Do not accept "sound quality gets better" or "file size increases". |

**Total: 20 marks**