Grade 7 Computing

Unit 2 · How Computers Store Everything

ANSWER KEY · FOR TEACHERS

Full marks 35

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. character code
2. ASCII
3. Unicode
4. code point
5. UTF-8
6. font
7. overflow
8. RGB

K · 4

Each carries 0.5 mark.

2 Multiple choice

i. **b.** 10110 — U · 1

22 = 16 + 4 + 2, so the 16, 4 and 2 places are 1: 10110. Halving gives the same: 22 → 11 r 0 → 5 r 1 → 2 r 1 → 1 r 0 → 0 r 1, read upwards 10110. (11010 is 26.)

ii. **c.** 1001 — A · 1

6 + 3 = 9 = 1001. Column by column: 0 + 1 = 1; 1 + 1 = 10 (write 0, carry 1); 1 + 0 + 1 = 10 (write 0, carry 1); 0 + 0 + 1 = 1.

iii. **c.** 98 — U · 1

A small letter's code is its capital's plus 32: 66 + 32 = 98. (67 is **C**, the next capital.)

iv. **c.** 6 — A · 1

Two Devanagari code points, 3 bytes each: 2 × 3 = 6 bytes.

v. **c.** yellow — U · 1

Red and green light at full, with no blue, make yellow. (With paint you would get a muddy brown, which is the trap: screens mix light, not paint. White would need blue at 255 too.)

3 Binary numbers

a. **ANSWER** — A · 2

Divide	Answer	Remainder
44 ÷ 2	22	0
22 ÷ 2	11	0
11 ÷ 2	5	1
5 ÷ 2	2	1
2 ÷ 2	1	0
1 ÷ 2	0	1

From the bottom up: **101100.** Check: 32 + 8 + 4 = 44.

MARKING SCHEME

✓ The answers and remainders in the table: 22 r 0, 11 r 0, 5 r 1, 2 r 1, 1 r 0, 0 r 1.

✓ 101100, read from the bottom up.

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b. MARKING SCHEME A · 3

- ✓ i. 0101 + 0110 = 1011 (5 + 6 = 11).
- ✓ ii. 1011 + 0111 = 10010 (11 + 7 = 18).
- ✓ iii. 01101001 + 00010111 = 10000000 (105 + 23 = 128).

c. MARKING SCHEME A · 3

- ✓ i. 240 + 32 = 272, which is 100010000 in binary (9 bits).
- ✓ ii. The 9th bit is lost, so the byte holds 00010000, which is 16 (272 − 256).
- ✓ iii. Overflow; avoid it by keeping the number in more bits (such as 16), or by checking whether the answer is too big before using it.

4 Text is numbers

a. MARKING SCHEME U · 2

- ✓ 78 = N (65 + 13), and 101 = e, 112 = p, 97 = a, 108 = l (counting on from a = 97).
- ✓ The message is **Nepal**.

b. MARKING SCHEME U · 2

- ✓ Stored in the order it is said: क, ि, त, ा, ब (ि after क, the consonant it belongs to).
- ✓ The font draws ि on the left of its consonant: the codes say which sounds come in which order, and the font decides the shapes and where they go.

c. MARKING SCHEME A · 2

- ✓ Nepal: 5 characters × 1 byte = 5 bytes; नेपाल: 5 codes × 3 bytes = 15 bytes.
- ✓ English letters have code points under 128, which UTF-8 stores in 1 byte; Devanagari code points (2304 to 2431) take 3 bytes each.

d. MARKING SCHEME U · 3

- ✓ i. The notice was typed in Preeti, which saves English letters that only the Preeti font draws as Nepali; without that font she sees the English letters really stored.
- ✓ ii. A search compares stored codes, and the file holds the codes of English letters, not the Nepali codes of सूचना.
- ✓ iii. Convert it with a Preeti-to-Unicode converter (and use a Unicode font), then read the result and fix any wrong words, checking the converter was set to the right old font.

5 Colors from numbers

ANSWER K · 2

Color	Red	Green	Blue
black	0	0	0
white	255	255	255
yellow	255	255	0
cyan	0	255	255

MARKING SCHEME

- ✓ black 0, 0, 0 and white 255, 255, 255.
- ✓ yellow 255, 255, 0 (red + green light) and cyan 0, 255, 255 (green + blue).

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6 Calculations

a. ANSWER A · 3

i. 1,200 × 900 = **1,080,000 pixels.**
ii. 1,080,000 × 3 = **3,240,000 bytes.**
iii. 3,240,000 ÷ 1,024 ÷ 1,024 ≈ **3.1 MB.**

MARKING SCHEME

✓ 1,200 × 900 = 1,080,000 pixels.
✓ × 3 = 3,240,000 bytes.
✓ ÷ 1,024 ÷ 1,024 ≈ 3.1 MB.

b. ANSWER A · 2

Bytes a second: 16,000 × 2 = 32,000. In a minute: 32,000 × 60 = **1,920,000 bytes.**
In KB: 1,920,000 ÷ 1,024 = **1,875 KB** (about 1.8 MB).

MARKING SCHEME

✓ 16,000 × 2 × 60 = 1,920,000 bytes.
✓ 1,920,000 ÷ 1,024 = 1,875 KB.

7 Think

ANSWER HA · 2

A spell-checker only checks that each word is in its list of correct words. घर is a real word, so it passes, even though it isn't the word Ramesh meant. Preeti text holds the codes of English letters, not Nepali ones, so there are no Nepali words in it to look up: it must be converted to Unicode first.

MARKING SCHEME

✓ घर is a real word in the list; a spell-checker checks only that a word exists, not that it is the word meant.
✓ Preeti text holds English letters' codes, not Nepali codes, so nothing in it matches the Nepali word list.

8 Activity: You, in numbers

(not marked)

WHAT STUDENTS SHOULD FIND

Each letter's code counts on from A = 65 or a = 97: for **Asha**, A = 65 = 01000001, s = 115 = 01110011, h = 104 = 01101000, a = 97 = 01100001. A capital and its small letter differ only in the bit worth 32. The name takes one byte a letter. Any color is three numbers from 0 to 255, such as orange 255, 140, 0.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	6	10	17	2	**35**

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