Final Exam Model Paper 3

ANSWER KEY

Full marks 50 · 2 hours

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

A practice paper by Science Playground, made to CDC's Specification Grid, Computer Science, Grade 9 (2082); not an official CDC or exam board paper.

Group A

10 × 1 = 10

1. **(i)** the control unit (CU)
2. **(i)** 116
3. **(i)** a laser printer
4. **(i)** the micro:bit
5. **(iii)** the database on the server that stores the orders
6. **(ii)** H_2O and 10^3
7. **(ii)** Tim Berners-Lee
8. **(ii)** Open only pages whose address starts with https, read the domain before typing anything, and leave banking for a trusted connection or a trusted VPN.
9. **(ii)** #
10. **(ii)** 1, 4, 7

Group B

10 × 2 = 20

11. **[2]**

Hard disk drive (HDD)	Solid state drive (SSD)
Stores data as magnetism on spinning platters, read by a moving head.	Stores data in flash memory chips, with no moving parts.
Slower: about 80 to 160 MB/s.	Much faster: about 200 to over 3,500 MB/s.
Cheaper for each GB, and comes larger.	Costs more for each GB.
Damaged easily by knocks and drops.	Survives knocks and drops well.
Makes some noise and uses more power.	Silent, and uses less power.

(Any two.)

Marking scheme

- One correct difference with both sides (e.g. spinning platters / flash chips, no moving parts).
- A second correct difference (e.g. slower / faster; cheaper per GB / costlier).

12. **[2]**

a. **Packaged** software: it is ready-made for everyone, for a common task (writing documents), and used as it is.

b. **Customized** software: it was made to order for the particular needs of that one cooperative.

Marking scheme

- a. Packaged, because it is ready-made for general use by everyone.
- b. Customized, because it was made for the needs of one organization.

13. **[2]**

a. Make groups of 4 bits from the right, adding 0s on the left to fill the last group, and write each group as one hexadecimal digit:

0101	1011
5	B (11)

So $(1011011)_2$ = **$(5B)_{16}$**.

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b. A = 10 and B = 11. Multiply each digit by its place value (powers of 16) and add:
$10 \times 16^1 + 11 \times 16^0 = 160 + 11 = 171$
So $(AB)_{16}$ = **$(171)_{10}$**.

Marking scheme

- a. Groups of four bits shown and $(5B)_{16}$.
- b. A = 10, B = 11 with place values of 16, and $(171)_{10}$.

14. a. **[2]**

```
  1 0 1 1 0
+   1 1 1 1
-----------
1 0 0 1 0 1
```

From the right: 0 + 1 = 1; 1 + 1 = 10 (0, carry 1); 1 + 1 + 1 = 11 (1, carry 1); 0 + 1 + 1 = 10 (0, carry 1); 1 + 1 = 10 (0, carry 1); the last carry goes in front. So the sum is **$(100101)_2$**. Check: 22 + 15 = 37.

b.

```
  1 0 0 0 1 1
-     1 1 0 1
-------------
  0 1 0 1 1 0
```

From the right: 1 − 1 = 0; 1 − 0 = 1; 0 − 1 needs a borrow, which comes from the 1 three places to the left, through two 0s that become 1s: 10 − 1 = 1; then 1 − 1 = 0; 1 − 0 = 1; the first 1 lent, leaving 0. So the difference is **$(10110)_2$**. Check: 35 − 13 = 22.

Marking scheme

- a. $(100101)_2$, with the carries shown.
- b. $(10110)_2$, with the borrows shown.

15. **[2]**

```
 1  <!DOCTYPE html>
 2  <html>
 3    <head>
 4      <title>My village</title>
 5      <style>
 6        h1 { color: green; text-align: center; }
 7        p { font-size: 18px; }
 8      </style>
 9    </head>
10    <body>
11      <h1>Welcome to Kagbeni</h1>
12      <p>Our village is on the bank of the Kali Gandaki.</p>
13    </body>
14  </html>
```

Internal CSS goes in a `<style>` tag inside `<head>`; its rules then style every `<h1>` and every `<p>` of the page.

Marking scheme

- The `<style>` … `</style>` tag inside `<head>`.
- The two rules correct: `h1 { color: green; text-align: center; }` and `p { font-size: 18px; }`.

16. A **search engine** is a website that finds web pages from the keywords you type, by crawling the web, indexing the pages and ranking them. Examples: Google, Bing, DuckDuckGo. **[2]**
The - (NOT) operator leaves out pages with the word after it: `momo recipe -chicken` shows momo recipes that don't mention chicken (for example vegetable or buffalo momos), while `momo recipe` shows all momo recipes, chicken ones included.

Marking scheme

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- Search engine: a program or website that finds web pages from keywords (with an example).
- `-chicken` leaves out the pages containing "chicken", so fewer, narrower results.

17. Any two, each with its reason: **[2]**

- **Join on time, with your real name showing**, so the teacher knows who is present and the lesson isn't interrupted.
- **Keep your microphone muted** when you aren't speaking, to cut background noise for everyone.
- **Use raise hand or the chat** to ask a question, so people don't talk over each other.
- **Never record the class or take screenshots of people without permission**, to respect their privacy.
- **Dress and sit as you would in school**, with light in front of you and a plain background, to keep the class respectful and easy to follow.
- **Share the meeting link only with the class**, so strangers can't join.

Marking scheme

- First rule with its reason (e.g. mute when not speaking: less noise).
- Second rule with its reason (e.g. no recording without permission: privacy).

18. A **flowchart** is a pictorial (graphical) representation of an algorithm: each kind of step is drawn as its own shape, joined by arrows (flow lines) that show which step comes next. **[2]**

- **Decision:** a **diamond**, with two ways out, Yes and No.
- **Input or output:** a **parallelogram**, for reading a value or displaying a result.

Marking scheme

- Flowchart: a picture of an algorithm, with shapes for steps and arrows for the flow.
- Decision: diamond; input/output: parallelogram.

19. **[2]**

a	b	a != b	a > b	What changes
24	36	True	False	b = 36 − 24 = 12
24	12	True	True	a = 24 − 12 = 12
12	12	False		(loop ends)

```
a = 24
b = 36
while a != b:
    if a > b:
        a = a - b
    else:
        b = b - a
print("HCF:", a)
```

OUTPUT

```
HCF: 12
```

Marking scheme

- A correct dry-run table (a and b each time round the loop, and the check that ends it).
- The output: `HCF: 12`.

20. **[2]**

```
1  import math
2  students = int(input("Number of students: "))
3  benches = math.ceil(students / 3)
4  print("Benches needed:", benches)
```

OUTPUT

```
Number of students: 40
Benches needed: 14
```


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40 ÷ 3 = 13.33, and `math.ceil()` rounds **up** to 14, since the student left over still needs a bench. (`(students + 2) // 3`, or `students // 3` plus 1 when `students % 3` is not 0, also work.)

Marking scheme

- The number of students read with `int(input())`.
- The benches worked out by rounding up (`math.ceil(students / 3)` or any correct way) and displayed.

Group C — 5 × 4 = 20

21. A **computer** is an electronic device that accepts data (input), processes it according to a set of instructions stored in it, gives out the result as information (output), and stores data and information for later use. **[4]**

Features (any three):

- **Speed:** it carries out billions of instructions every second.
- **Accuracy:** it does every calculation exactly; wrong results come from wrong data or a wrong program (garbage in, garbage out).
- **Diligence:** it does the same task again and again for hours without getting tired or careless.
- **Versatility:** it can do many different kinds of work, given different programs.
- **Storage:** it keeps huge amounts of data and programs, and finds any of it in a moment.
- **Automatic:** once given its program and data, it does the whole task by itself.

Marking scheme

- Computer: an electronic device that takes input, processes it by stored instructions, gives output and stores data.
- The first feature explained (e.g. speed: billions of instructions a second).
- The second (e.g. accuracy: exact results; GIGO).
- The third (e.g. diligence: works without tiring).

22. **3, 2, then 4 and 1 inside block 2**: **[4]**

- 3, **when green flag clicked** (Events): the hat block that starts the script, on top.
- 2, **repeat 4** (Control): a C block that runs the blocks inside it four times.
- 4, **move 100 steps** (Motion), inside the repeat.
- 1, **turn ↻ 90 degrees** (Motion), inside the repeat, under the move.

Four sides and four quarter turns make a square: 4 × 90° = 360°, one full turn, so the sprite ends where it started.

Figure 2 The four blocks in their right order.

Marking scheme

- Block 3 (when green flag clicked) first, on top.
- Block 2 (repeat 4) under it.
- Block 4 (move 100 steps) inside the repeat.
- Block 1 (turn 90 degrees) inside the repeat, after the move.

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23. **[4]**

```html
<!DOCTYPE html>
<html>
  <head>
    <title>Bandipur Homestay</title>
  </head>
  <body>
    <h1 style="color: green; text-align: center;">Welcome to Bandipur Homestay</h1>
    <p>Stay with a Newar family in the old bazaar, with the Himalaya from the roof.</p>
    <p>Our facilities:</p>
    <ul>
      <li>Home-cooked dal bhat</li>
      <li>Free Wi-Fi</li>
      <li>Sunrise from the roof</li>
    </ul>
    <p><a href="mailto:stay@example.com">Email us to book</a></p>
  </body>
</html>
```

Marking scheme

- The page's structure: `<html>`, `<head>` with `<title>Bandipur Homestay</title>`, and `<body>`.
- The heading with inline CSS: `<h1 style="color: green; text-align: center;">`.
- The paragraphs and the unordered list: `<ul>` with three `<li>` items.
- The email link: `<a href="mailto:stay@example.com">Email us to book</a>`.

24. **[4]**

Cybersecurity is the protection of computer systems, networks and data from theft, damage, unauthorized access and cyberattacks, so that information stays private (confidentiality), correct (integrity) and there when needed (availability).

Any three methods:

- **Use strong passwords:** long (a passphrase of random words), with no names, dates or sequences, and a different one for every account, never shared.
- **Multi-factor authentication (MFA):** logging in needs two different kinds of proof, such as a password and a code on your phone, so a stolen password alone isn't enough.
- **Software updates:** keep the operating system, apps and antivirus up to date, since updates close the holes attackers use.
- **Firewall:** it filters the connections into and out of a computer, blocking those its rules don't allow.
- **Antivirus:** finds and removes malware on the device.

Marking scheme

- Cybersecurity: protecting computers, networks and data from theft, damage and attack.
- The first method explained (e.g. strong, unique passwords).
- The second (e.g. MFA: a second kind of proof).
- The third (e.g. updates close holes; a firewall filters connections).

25. **[4]**

```python
rain = [12, 65, 30, 80, 0, 55, 20]
total = sum(rain)
highest = max(rain)
heavy = 0
for mm in rain:
    if mm > 50:
        heavy = heavy + 1
print("Total rainfall:", total, "mm")
print("Highest in a day:", highest, "mm")
print("Days with more than 50 mm:", heavy)
```

OUTPUT

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```
Total rainfall: 262 mm
Highest in a day: 80 mm
Days with more than 50 mm: 3
```

(A loop that adds up the total and finds the highest is also correct.)

Marking scheme

- The rainfall stored in a list.
- The total and the highest worked out (`sum()` and `max()`, or a loop).
- A loop with `if mm > 50` counting the heavy days.
- The three results displayed.

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