Unit 3 · Databases and SQL

WORKSHEET

Full marks 30

Name _____ Class _____ Roll no. ____ Date _____ Marks _____ / 30

1 Key words [4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

composite key	database	DBMS	field	foreign key	index	primary key	query	record	redundant

A _____ is an organized collection of data, looked after by a program called a _____. In a table, each row is one _____ and each column is one _____. A field whose value is different in every record, such as a student ID, is the table's _____; when two fields are needed together, as student and subject in **marks**, it is a _____. A field that holds another table's primary key, such as `class_id` in **students**, is a _____. Data written more than once is _____, and its copies drift apart.

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Why is a student's name a poor primary key? [1]

a. Names are too long to store.
b. Two students can have the same name, and a name can be spelled differently or changed.
c. A name can't be text.
d. Databases can't search for names.

ii. In the school database, why is the class teacher stored in **classes** and not in **students**? [1]

a. Students don't have teachers.
b. So it is written once: changing a class's teacher is one change, and the copies can't disagree.
c. Because **classes** has more space.
d. SQL can't store names in **students**.

iii. A library lets each member borrow many books over time, and each book is borrowed by many members over time. What kind of relationship is this, and what does it need? [1]

a. one-to-one: a book ID field in the members table
b. one-to-many: a member ID field in the books table
c. many-to-many: a third table of loans, each row joining one member to one book
d. none: books and members can't be linked

iv. Which statement corrects Bibek Thapa's (student 102) Science mark to 72? [1]

a. `UPDATE marks SET mark = 72;`
b. `INSERT INTO marks VALUES (102, 'SCI', 72);`
c. `UPDATE marks SET mark = 72 WHERE student_id = 102 AND subject_id = 'SCI';`
d. `SELECT mark = 72 FROM marks WHERE student_id = 102;`

v. A shop's database has an index on every one of its 30 fields. What is the cost? **[1]**

a. There is none: more indexes are always better.

b. Each index takes space, and every new or changed row must update all 30 indexes, so saving data gets slower.

c. Indexes make searches slower.

d. The shop can no longer use SQL.

3 What does it give? [4]

Write the answer each query gives, as a table or a list of rows. Write "no rows" if it gives none.

A school library keeps this table, **loans**. An empty `returned` (NULL) means the book is still out.

loan_id	member	book	borrowed	returned
1	Anisha	Muna Madan	2026-09-02	2026-09-10
2	Binod	Seto Bagh	2026-09-05	NULL
3	Anisha	Karnali Blues	2026-09-12	2026-09-20
4	Deepa	Muna Madan	2026-09-15	NULL
5	Binod	Palpasa Cafe	2026-09-18	2026-09-25
6	Anisha	Seto Bagh	2026-09-28	NULL
7	Kiran	Karnali Blues	2026-10-01	2026-10-08

i. `SELECT member, COUNT(*) FROM loans GROUP BY member HAVING COUNT(*) >= 2 ORDER BY member;`

```
OUTPUT
```

ii. `SELECT book, member FROM loans WHERE returned IS NULL ORDER BY borrowed;`

```
OUTPUT
```

iii. `SELECT book FROM loans WHERE returned = NULL;`

```
OUTPUT
```

iv. `SELECT COUNT(*), COUNT(returned) FROM loans WHERE borrowed < '2026-09-20';`

```
OUTPUT
```

4 What does it print? [3]

Write exactly what the program prints, in the box under it.

```
import sqlite3

db = sqlite3.connect(":memory:")
db.execute("CREATE TABLE visits "
           "(school TEXT, grade INTEGER, size INTEGER)")
rows = [("Sunrise", 8, 42), ("Hillside", 10, 35),
        ("Sunrise", 9, 28), ("Valley", 8, 50)]
db.executemany("INSERT INTO visits VALUES (?, ?, ?)", rows)

query = ("SELECT school, SUM(size) FROM visits "
         "GROUP BY school ORDER BY SUM(size) DESC")
for school, total in db.execute(query):
    print(school, total)

row = db.execute("SELECT COUNT(*), MAX(size) FROM visits WHERE grade = ?",
                 (8,)).fetchone()
print(row)
print(row[0] + row[1])
```

OUTPUT

5 Which check catches it? [3]

Each value is typed into the school database. Write which kind of check refuses it, or how the mistake could be found if no check can. Each row carries 0.5 mark.

Field	Value typed	Which check, or how it is found
mark	130	
class_id	10C, a class the school doesn't have	
name	left empty	
born	13/05/2011	
student_id	139, for a new student (139 is Sita Shrestha)	
mark	67, but the answer sheet says 76	

6 Write the queries [4]

Write each query in SQL on the lines. Any query that gives the right rows gets the mark.

The school database has these tables (the keys are in bold):

- **students** (**student_id**, name, class_id, born, town), with born written like `'2011-05-13'`
- **marks** (**student_id**, **subject_id**, mark), one row per student per subject

Write a query for each:

i. the names and dates of birth of the 10B students born on or after 1 June 2011, in alphabetical order of name;
ii. the number of students in each class;
iii. the average Mathematics mark (its subject_id is `MATH`);
iv. the names and marks of the students who scored 90 or more in Computing (`COMP`), highest first.

7 Find and fix the bug [3]

Read the query, then answer.

The office wants the classes with more than 10 students, but this query stops with the error `misuse of aggregate: COUNT()`.

```
SELECT class_id, COUNT(*)
FROM students
WHERE COUNT(*) > 10
GROUP BY class_id;
```

i. Why can't the condition go in WHERE?
ii. Write the query correctly, and say what it gives.

8 Short answer [2]

Write a short answer to the following question.

A program adds up each student's marks with `GROUP BY students.name`. Its total for Sita Shrestha is 633, from 12 marks. What went wrong, and what should it group by?

9 Think [2]

Think, then answer.

A school's form refuses any name that isn't only the letters A to Z. Why might that be a bad rule? What would be a better one?

10 Activity: Try to break the rules (not marked)

At a computer, open the unit's page (the QR code) and find **Try to break the rules.** Try to save each row below, and write whether it is refused and which rule refuses it.

What you try to save	Refused?	Which rule refuses it, and which kind of check it is
A Science mark of 130 for student 141		
A Science mark of 70 for student 999		
A second Science mark, 70, for student 141		
A new student 150 in class 10C		
A Science mark of 70 for student 121, Asmita Bhattarai		